HOUSE OF LORDS SESSION 1996–97

SELECT COMMITTEE ON SCIENCE AND TECHNOLOGY

EU FRAMEWORK PROGRAMME FOR EUROPEAN RESEARCH AND TECHNOLOGICAL DEVELOPMENT

EVIDENCE

Ordered to be printed 25th February 1997

LONDON : THE STATIONERY OFFICE

£20·30

HL Paper 49–I

22501834272

HOUSE OF LORDS SESSION 1996–97

SELECT COMMITTEE ON SCIENCE AND TECHNOLOGY

EU FRAMEWORK PROGRAMME FOR EUROPEAN RESEARCH AND TECHNOLOGICAL DEVELOPMENT

This book is due for return on or before the last date shown below.

17 July '97

Don Gresswell Ltd., London, N.21 Cat. No. 1207 DG 02242/71

HL Paper 49–I

HOUSE OF LORDS SESSION 1996–97

SELECT COMMITTEE ON SCIENCE AND TECHNOLOGY

EU FRAMEWORK PROGRAMME FOR EUROPEAN RESEARCH AND TECHNOLOGICAL DEVELOPMENT

EVIDENCE

Ordered to be printed 25th February 1997

INFORMATION SERVICE
28 APR 1997
Wellcome Centre for Medical Science
07 XNA3
HouIL
3659.

LONDON : THE STATIONERY OFFICE

£20·30

HL Paper 49–I

CONTENTS

Page

ORAL AND WRITTEN EVIDENCE

Office of Science and Technology

Written Evidence ... 1
Oral Evidence, 6 November 1996 ... 26

Policy Research in Engineering, Science & Technology (PREST)

Written Evidence ... 39
Oral Evidence, 13 November 1996 ... 41

Confederation of British Industry (with SmithKline Beecham)

Written Evidence ... 50

SmithKline Beecham

Written Evidence ... 62
Oral Evidence, 13 November 1996 ... 79
Supplementary Written Evidence ... 86

Royal Academy of Engineering

Written Evidence ... 88
Oral Evidence, 26 November 1996 ... 91

Economic and Social Research Council

Written Evidence ... 103
Oral Evidence, 26 November 1996 ... 107
Supplementary Written Evidence ... 115

Biotechnology and Biological Sciences Research Council

Written Evidence ... 116
Oral Evidence, 26 November 1996 ... 118

Professor Jorma Routti, Director-General, DGXII, European Commission

Written Evidence ... 126
Oral Evidence, 3 December 1996 ... 131

Committee of Vice-Chancellors and Principals

Written Evidence ... 143
Oral Evidence, 11 December 1996 ... 149
Supplementary Written Evidence ... 158

Sir William Stewart

Oral Evidence, 11 December 1996 ... 162

Sir Dai Rees

Oral Evidence, 14 January 1997 ... 169

WRITTEN EVIDENCE

Dr J Borgman, European Science and Technology Assembly ... 177
Confederation of British Industry (supplementary) ... 177
Economic and Social Research Council (supplementary) ... 178
Engineering and Physical Sciences Research Council ... 179

Mr Tim Gatland ... 184
Industry, Research and Development Advisory Committee ... 187
Institution of Civil Engineers ... 189
Joint Research Centre ... 190
Lord Kennet ... 193
Loughborough University ... 194
Mrs Eryl McNally MEP ... 195
Medical Research Council ... 199
Natural Environment Research Council ... 204
Office of Science and Technology (supplementary) ... 206
Royal Academy of Engineering (supplementary) ... 211
Royal Society ... 212
Royal Society of Chemistry ... 215
Treasury ... 218
University of Edinburgh ... 219
University of Leeds ... 222
Towards FP5: Scientific and Technological Objectives ... 223

CALL FOR EVIDENCE

The Sub-Committee invites written submissions on matters of relevance to this topic, but in particular on the questions listed below.

DIRECTION

1. What lessons should be derived from the Fourth Framework Programme?

2. Should there be a Fifth Framework Programme? If so, what should be the main objectives or focus and how should the priorities be set?

3. What should be the balance between basic and applied, pre-competitive, and near-market research funded through a Fifth Framework Programme?

4. What should be the role of Task Forces in a Fifth Framework Programme?

5. Can it be demonstrated that the UK gets clear value for money from participation in the Framework Programme and, in particular, what has been the impact on industrial competitiveness, social and economic sectors?

PRIORITIES

6. What should be the role and priorities of the Joint Research Centre, and how should its activities be funded?

7. How should the EU meet its 'cohesion objective' of enabling SMEs and Member States with less scientific expertise to benefit from the Framework Programme, while ensuring that the highest scientific standards for EU research are met?

FUNDING AND ADMINISTRATION

8. Does the European Commission have the adequate expertise and the mechanisms to support the Framework Programme?

9. Is the current length of Framework Programmes too long and would they benefit from shorter time frames with more flexible funding? Alternatively, should the Programmes be longer?

10. Should Task Forces have ear-marked funds to support their own research programmes?

11. How should the UK allocate funding for the Framework Programme and other EU research initiatives to ensure that UK researchers are not disadvantaged?

MINUTES OF EVIDENCE

TAKEN BEFORE THE SELECT COMMITTEE ON SCIENCE AND TECHNOLOGY

WEDNESDAY 6 NOVEMBER 1996

Present:

Craig of Radley, L.	Porter of Luddenham, L.
Dixon-Smith, L.	Selborne, E. (Chairman)
Gregson, L.	Soulsby of Swaffham Prior, L.
Haskel, L.	
Nathan, L.	Lewis of Newnham, L.
Phillips of Ellesmere, L.	Platt of Writtle, B.

Memorandum by the Office of Science and Technology, Department of Trade and Industry

INTRODUCTION

This note seeks to provide the Sub-Committee with a range of background information relevant to its inquiry into the European Union's Framework Programmes for Research and Technological Development (RTD). It follows broadly the structure of the call for evidence issued by the Sub-Committee in August 1996.

2. The initial United Kingdom position paper on a Fifth Framework Programme (FP5), submitted to the European Commission in June 1996, forms a key supporting document in the Government's evidence to the Sub-Committee. A copy of this paper is at Appendix A.

BACKGROUND

3. The European Union has run framework programmes for RTD since 1984. Prior to that date, research was undertaken by the Community under the umbrella of a wide range of other programmes. Since 1984, successive framework programmes have encompassed progressively more of the Union's overall RTD effort. The Fourth framework programme (FP4) is now intended to cover all the Union's RTD activity. The mandate for the current framework programme is set out in Articles 130f to 130p of the Treaty.

4. The evolution in the scope of the frameworks makes it difficult to describe year-on-year the financial profile of European Community RTD. The picture is further obscured by the relatively long term nature of many of the projects approved: the approval of a project in one year may create commitments over a number of years, the later ones of which may run over into the currency of subsequent framework programmes. In addition, the payments actually made to researchers almost always follow a still different pattern, depending on the progress of the work. In these circumstances, it is only really possible to review the financial development of EU RTD by reference to the annual commitments made by the Commission. A table outlining the pattern of financial commitments since 1984, based on Commission figures, is at Appendix B (p.209).

5. The current framework programme budget constitutes around 4 per cent of the total EU budget. This is, as agreed at the Edinburgh Council, within the band of half to two thirds of the "internal policies" category of the EU's financial perspectives for 1992–1999. It is equivalent to about 3 per cent of the aggregate investment in 1993 of individual member States in RTD (from both public and private sector sources) or about 9 per cent of their total non-business investment in RTD in 1993.

6. The Commission funds the EU's research programmes through the budgetary contributions made by member States to the Union as a whole. The UK does not, therefore, contribute separately to the European research budget, but provides a significant share through its overall payments to the Union. The UK's pro rata contribution to the EU research budget, year-on-year, is shown in Appendix C. Between 1986–87 and 1996–97, as shown in Appendix C (p.210), the value of the UK notional contribution to the European research programmes has risen from being equivalent to some 2.1 per cent of the total UK Government expenditure on SET (or 3.5 per cent of public civil SET) to being equivalent to about 6.5 per cent of the total planned UK Government expenditure on SET (10.3 per cent of public civil SET).

7. To encourage the effective management of domestic and European priorities, the Government takes account of the UK's notional contribution to the Union's expenditure on RTD in the Public Expenditure Survey process. The European component of this planning exercise is known colloquially as EUROPES. In the survey, individual departments take responsibility for certain components of the framework on the basis of their policy interest. The value of this interest is attributed to expenditure baselines at the start of the

process. It is then for the relevant Secretary of State to reallocate resources from elsewhere in his or her area of control, or to argue for net increases, to replace any portion of the baseline budget which has been attributed in this way.

8. Attribution is a budgetary discipline not a mechanical process. It does not lead automatically or necessarily to an equivalent reduction in domestic expenditure on RTD. The Science Budget, for example has grown continuously over the past 10 years, notwithstanding the substantial increase in the UK's contribution to the EU's RTD budget over the same period (see Appendix D, p.210).

LESSONS TO BE LEARNED FROM THE FOURTH FRAMEWORK PROGRAMME (FP4)

9. FP4 and its specific programmes derive from a series of decisions taken by the Council (in co-decision or consultation with the Parliament) in the course of 1994. The first contracts under FP4 were let in 1995. As a result, although departments have a good deal of broadbrush experience of FP4 in its first 18 months, only limited conclusions can be drawn about the programme's overall effectiveness at this stage. It is in the nature of these programmes that the process of evaluation is both iterative and long term. In forming a view on FP5, therefore, the Government needs to take into account evidence from a wide range of sources, including evaluations of earlier framework programmes and their components, emerging information on the progress of FP4, the Commission's annual reports on European RTD, and feedback from participants and other interested parties.

10. In response to pressure from member States, particularly the UK, the Commission has put in place in FP4 a much more comprehensive range of procedures designed both to monitor the programme as it progresses and from time to time more explicitly to evaluate its outcomes as they emerge.

1996 monitoring reports

11. The first monitoring reports, written by independent monitoring panels, were completed in Spring 1996. A separate report was compiled for each of FP4's specific programmes. An overview report was written to draw together the threads for the programme as a whole. Inevitably, given that they were looking only at the first year of the programme, the monitoring panels concentrated primarily on management issues such as the efficiency of the application and selection process and contract negotiation. They examined in particular the numbers and types of applications and projects selected. As FP4 progresses, the Government expects the monitoring panels to be able to focus more directly on results and their exploitation.

12. The 1996 monitoring reports showed that FP4 has got under way successfully and that it is being managed reasonably efficiently. Significant aspects of the management process were however felt to need improvement. In particular, panels commented on delays in processing applications, where the time between the closure of calls and the signing of contracts can be 12 months or more; insufficient transparency in the project evaluation process, including poor feedback to applicants; a very high rate of oversubscription, leading to a waste of resources, and the imposition by the Commission of excessive changes to successful proposals at the contract negotiation stage. Recommendations were made to address these. Partly in response to these conclusions, the Commission has recently set in hand a review of programme management processes to tackle these and similar problems.

13. The monitoring reports deal with the programme at a European level. They do not seek to assess its impact on individual member States. Nor does the Commission make available statistical data on the participation of individual member States' research teams in the programme as a whole. The UK is pressing the Commission to be more open in this respect but, as yet, without result. Departments, Research Councils and bodies such as the Commission's Relay Centres and UKRHEEO (the United Kingdom Research and Higher Education European Office in Brussels) both promote the programmes and help UK researchers bid to participate. Departments, through these activities and through their involvement in programme management committees, are able to develop a broad impression of the UK's involvement in FP4. This suggests that there is a high level of interest in the programme from UK researchers, who are keen to strengthen collaboration with academia and industry elsewhere in the EU, and a high level of UK participation. Estimates based on departments' informal monitoring of their programmes suggest that in the main areas of the programme (the "first activity"), UK research teams are involved in over 75 per cent of all FP4 projects. And UK led projects are achieving consistently higher than average success rates overall—in some programmes they account for over 30 per cent of those selected—against very high levels of competition: on average only 20 per cent of all applications get funded. The UK appears to be participating particularly strongly in communications technologies, agriculture, medicine, biotechnology, marine science and technology, standards and measurement technology and targeted economic and social research.

Commission Annual Report

14. Under Article 130p of the Treaty, the Commission is required annually to send a report on its activities to the Council and the Parliament. Its second such report, for 1995, was finalised by the Commission in September 1996. The report reviews progress with both FP4 as a whole and the individual programmes within it.

15. At the level of the framework programme, the Annual Report provides a wide range of input statistics. It shows, for example, that 2,660 projects involving 12,185 participants were approved in 1995; that a total of 10,043 projects were let under FP3; and that 20 per cent of participants in the first year of FP4 (as compared with 17 per cent in 1994) involved SMEs. This provides useful background for the monitoring of the programme.

16. The UK remains critical, however, of the Commission's Annual Report. It is produced very late—nine months after the year to which it relates. It focuses too much on inputs and not enough on outputs. More consistency is needed in the accounts given of specific programmes, with generally more emphasis being given to results, and clearer recognition of the findings of the monitoring reports. The government is pursuing these points with the Commission through the usual channels.

Five year evaluation

17. Clearer views on the effectiveness of FP4 are expected to emerge as subsequent monitoring reports are produced and through the evaluations required by the Framework programme legislation are completed. At the mid-point of framework programmes, each specific programme is to be subject to a full evaluation looking back at its impact over the previous five years. Like the monitoring reports, these evaluations are to be conducted by independent panels of experts. An overall evaluation is also to be conducted for the framework programme as a whole, drawing together the findings of the individual evaluations.

18. Panels have recently been appointed to conduct the evaluations required at the mid-point of FP4. These are expected to report towards the end of 1996 so that the results are available before the Commission brings forward its proposal for the Fifth framework programme. While the evaluations will look back at the impact of the later years of FP3 and, where relevant, that of FP2, they should also be able to give an assessment of early progress with FP4 and to make recommendations for any necessary future improvements.

19. The government remains concerned, however, at the way the Commission has handled these evaluations. The teams evaluating specific programmes were appointed very late, and have been set very restrictive timescales in which to report. There is some anecdotal evidence that they have therefore been artificially constrained in the extent to which they can gather relevant evidence for their evaluations. The overarching framework evaluation panel will in addition have very little time in which to consider the reports of the specific programme evaluation teams before it is required to produce its own report. The UK will look carefully at these aspects when the reports are made available.

SHOULD THERE BE AN FP5? WHAT KIND?

20. The government believes that there is a continuing need for a European programme of research and technological development directed, as set out in Article 130f of the Treaty, at promoting the competitiveness of Community industry and underpinning EU policies. The UK position paper (Appendix A) on FP5 recommends that the programme be focused even more strongly in future on these objectives, by adapting the structure, management and content of the programmes so as to place a new emphasis on achieving material and important results.

21. As before, the government has agreed that the programme should concentrate on supporting the RTD that can only be done at European level and where there is clear added value from such RTD. While the early framework programmes may have put a premium on encouraging Europe's researchers to work together, such collaboration is now well established and widespread. The government's view is that the programme now needs to be directed more sharply and clearly towards the Treaty objectives.

22. The government considers that this goal can be achieved with a programme at most of current size and possibly smaller. The emphasis should be on making more effective use of programme resources rather than necessarily increasing the overall level of expenditure. In parallel, there remains room for the Commission to play a part in helping member States better to co-ordinate in the RTD activities, ie to search for a better overall deployment of Europe's RTD resources.

23. Reflecting the experience of the technology foresight exercise, the UK paper places particular emphasis on the importance of FP5 focusing more clearly on users' needs. In part at least, previous programmes have been criticised for pursuing technological advances, with insufficient emphasis on market or policy priorities. In addition, earlier programmes have been criticised for covering too much ground: impact has been lost because resources have been too thinly spread.

24. To redress this, the UK paper argues that the programme should be defined by reference to clear

objectives, reflecting user needs, which seek to address the medium-term technological needs of European industry and to support European policies, including those related to quality of life more broadly. Stronger prioritisation is also needed.

25. It is important that the framework programme's management structure should support and not impede these aims. Currently, the rigid divisions between different programme areas can reduce its contribution to the achievement of industrial or social goals which depend on a range of technologies. Poor communications between different Directorates-General are a further hampering factor. While the Commission's task forces were set up in part at least to address this problem, their impact has been reduced both by the way in which they were set up and by the way in which their successful implementation would depend in some cases on cutting across the structures of the existing framework programme and of the Commission.

26. The UK paper seeks to address these issues by recommending that the programme be based on user driven thematic objectives; that the RTD relevant to these objectives be delivered through a small number of technology or policy based programmes; and that a key role be given to users in programme design and oversight. The UK has not at this stage proposed specific objectives, or related S&T priorities, although the position paper provided some illustrative examples. Specific proposals to reflect the UK's priorities will be elaborated in the light of developments in the negotiations, which are beginning now and will continue through 1998. The continuing evolution of the UK technology foresight priorities will play an important role in guiding UK views in this area.

27. Beyond the RTD programmes (the "first activity"), the UK also attaches importance to the framework programme's "horizontal" activities. On international co-operation, the UK has consistently argued that the framework programmes should be opened as far as possible to researchers from third countries. In addition, however, there remains a need for an international co-operation programme designed to support financially the participation in the programme of key groups of the EU's neighbour countries and the developing world. On dissemination and exploitation, the paper argues that a higher priority, and a higher proportion of the budget, should be allocated to the follow-through of funded RTD, particularly through action in the specific programmes. On researcher training and mobility, the paper argues for a greater emphasis to be placed on the involvement of industry.

28. The UK paper indicates that improving the efficiency of programme management, and effective monitoring and evaluation are further important goals of FP5. As described in paragraph 12, there are major problems of bureaucracy and delay that need to be addressed. In particular, there remains scope for shortening timescales for project selection; improving the publicity and advice available to applicants, including making better use of electronic means; fuller transparency in all aspects of the project selection process; reducing interference in the scale and scope of projects while still securing value for money in the contract negotiation process; improving the administration of the measures to encourage SME participation; and reducing oversubscription by improving programme definition and tightening the focusing of calls for proposals.

29. Other member States have declared their priorities for FP5 in their position papers. There is an encouraging convergence of view, particularly among the larger member States, on the fundamentals of a more output oriented, more cost-effective and better managed programme.

BALANCE BETWEEN PRE-COMPETITIVE, NEAR MARKET

30. The UK position paper makes clear that, like its predecessors, FP5 should focus on objective led applied and strategic RTD. As a matter of principle, the framework programmes should not deal with near-market research and development, which should be left to the market. Nonetheless, pre-competitive demonstration and validation projects, the results of which are made generally available, may play an essential role in achieving exploitation of research results and should therefore come within the scope of the programme. Beyond that, the Eureka framework provides a mechanism for European countries to support collaborative RTD that has moved beyond the pre-competitive stage on the path to market exploitation. While the framework programmes and Eureka have similar goals, ie the reinforcement of Europe's technology base and improved industrial competitiveness, their roles are complementary and should be kept distinct.

31. The paper also argues that the framework programme should not serve as a funding source for pure basic research as such. This should be the responsibility of member States. In line with the treaty objectives, the role of FP5 should be to develop the technologies needed for competitiveness and quality of life in the medium term and to underpin Community policies. This implies that the major emphasis should be on applied strategic research. That said, the paper recognises that, where users see long term fundamental research making an essential contribution to programme goals in particular areas, it would be appropriate for such research to be supported.

32. Overall, the paper argues that the broad balance of activities along the RTD spectrum in FP4 should be continued in FP5. The main aim should be to ensure that the programme helps to bring forward the generic

technologies (in materials, biochemistry, communications, etc) which are needed for European industry to remain competitive in world markets. This is not to be confused with sectoral support which, again, is no business of publicly funded European RTD programmes. Rather, like priorities described in the UK foresight exercise, the aim should be to support the research which lays a firm basis for future competitiveness.

Task Forces

33. Where task forces have worked well, they have provided a useful tool for clearer definition of RTD objectives by involving a wide range of industrial and research community interests. They have usefully brought together different Commission Directorates-General, thus improving inter-programme co-ordination and the integration of RTD with Community policies. Some task forces (for example those on vaccines and viral diseases and on aeronautics) have produced worthwhile reports which have served to draw out important conclusions for the targeting of RTD efforts in Europe.

34. The Government remains dubious, however, about the benefits of task forces as currently defined. Selected on an arbitrary basis without consultation with member States, the existing task forces define a skewed set of priorities. In several cases, initially at least, they have consulted only patchily. A number have failed adequately to involve member States. In others, their remits have lacked coherence and ranged unmanageably wide, leading them to address issues to which RTD is only partly relevant. As a result, recommendations have been ill-founded in some cases.

35. As the lack of progress with the Commission's proposal for supplementary funding for FP4 has shown, particular problems have arisen in attempting to transplant task force recommendations onto a programme organised fairly tightly on technologies. Quite apart from the difficulties of reaching consensus on a heterogenous set of priorities, the management mechanisms of FP4 are ill-adapted to incorporate new areas of activity that cut across several programmes. These problems are exacerbated by confused authorities: as internal Commission working groups with no accountability to member States, task forces cannot be responsible for the adaptation of specific programmes, or be given any budgetary authority, to implement task force recommendations. So the task force conclusions have to be implemented through programme management committees. Whilst this can be done relatively easily in areas where there is close co-operation between the separate Commission structures (eg in the life sciences), in other areas it is proving more difficult to give effect to newly identified trans-programme priorities, especially where these clash with the priorities (for example of member state representatives on Management Committees) at the level of individual programmes.

36. In government's view, the best features of the task force approach—a problem oriented focus, a key role for RTD users, extensive consultation and concentration of expertise—are well worth carrying forward into FP5. But these principles need to be incorporated into a management structure for FP5 which can define and oversee the RTD needed to achieve targeted, user-led goals. To be successful, both the goals and the management mechanisms need to be built in from the start. As described above, retrospective adaptation to achieve these goals creates real difficulties.

37. The UK position paper makes proposals for procedures and machinery in FP5 to achieve these ends (see paragraphs 20-29). The best features of task forces are explicitly reflected in the proposed "Advisory Groups" which will be drawn from user interests, member States and the Commission. They will need closely to involve the scientific community. Their key roles are to identify the RTD needed to achieve each objective and provide strategic oversight as the programme proceeds. They can thus act as a proxy customer, ensure interprogramme co-ordination and provide a concentration of expertise.

Value for Money

38. The UK derives benefit from the framework programmes both through its share of programme receipts, which provide a substantial source of research funding, and more broadly, from gains from collaboration in RTD and the impact on the competitiveness of UK firms, for example from enabling them to extend their activities into new markets.

UK receipts

39. There are difficulties in establishing the UK's share of framework programme receipts. As a matter of principle, the Commission refuses to provide aggregated data on the shares of programme funding going to member States. The UK with other member States is pressing the Commission to provide this information. Although data on UK receipts has however been collated by the Office of National Statistics and the Higher Education Statistical Agency, it is not fully accurate. The most recent figures, for 1994/95 show UK receipts of £263 million, of which £89 million went to business enterprise, £145 million to higher education institutions and £28 million to public sector research organisations. The figure of £263 million slightly overstates the true figure since it includes some additional non-framework programme receipts that cannot be separated out.

40. It is not possible to make a straightforward comparison between the UK's notional contribution to the funding of the framework programme, which was £314 million in 1994/95, and the receipts it receives. Not all the framework programme budget is potentially available for redistribution to member States through contracts won by researchers. Of FP4's budget as a whole, about 7.3 per cent is top-sliced to fund the Joint Research Centre, the EU's own research institution. A further 8 per cent is allowed for administration. The categorisation of information in the annual EU budget however does not allow these elements to be readily identified, so reliable year by year comparisons of UK receipts with the amount potentially available to be won are not possible. Nevertheless, estimates suggest that currently UK receipts are of the same order of magnitude as the UK's contribution to that part of the overall budget that is available to member States. This, of course, ignores the broader financial benefits that derive from the exploitation of the research outputs and the non-financial benefits of participation. Though unmeasureable, these are likely to be considerable.

Broader impact

41. As the EU's RTD programmes are pre-competitive and long-term, their impact is typically not clear until several years after completion and even then the competitive benefits of the results may be difficult to identify or quantify. The lack of comprehensive data and limitations in the evaluations conducted by the Commission make such an assessment more difficult.

42. Nevertheless there is a fair amount of evidence from a variety of sources of the impact of the programme in the UK.

Impact study

43. The 1993 study "The Impact of European Community Policies for Research and Technological Development upon Science and Technology in the United Kingdom", which was funded jointly by OST and the Commission as part of a series of national studies, is the most thorough study of the impact of the framework programme in the UK. It gave a generally positive account. It showed that the programme was highly valued by UK academia and industry and that benefits arose through:

- accelerating the timing of research and broadening its scope beyond what would be possible at a corporate or national level;
- the results of the research itself and the derived intellectual property rights, both of which may be exploited more widely;
- access to complementary expertise and the development of longer term European links;
- the acquisition of new skills and enhanced technical standing;
- in the case of industry, the development of new products and processes, and commercial links including strategic partnerships which facilitate access for new markets; and
- influencing and participating in the setting of technical standards and other research related to the EU regulatory framework.

44. Collaborative links were often maintained after the completion of a project, for example between companies who have complementary expertise or interests. Repeat participations further underline the value ascribed to the programme by UK participants. The study considered that the broad orientation of the programme was 'on the right lines with respect to the competitiveness goal' though it was too early to make real judgements.

45. The main criticism made was the length and complexity of the application process, and other aspects of programme administration, which posed considerable burdens on applicants and participants. Barriers to the exploitation of results were also noted.

Previous Evaluations

46. Evaluations conducted by the Commission or by independent panels of experts of specific programmes in FP2 and FP3 provide further evidence of the impact of framework programmes, though their coverage is patchy and their quality variable. They do not therefore provide a reliable assessment of the framework programme as a whole. The extent to which the Commission has been willing to take their recommendations into account has also varied.

47. A number of common threads run through the evaluation findings. They have tended to find that programmes have achieved most if not all of their technical objectives and brought about results that would not have been achieved without EU support, or would have been achieved more slowly; and that they have promoted successful and long-lasting collaborations, which have had positive effects on competitiveness. Nearly all evaluations commented on the complexity and bureaucracy of programme administration and the lack of transparency of the project selection process. These have acted as a particular discouragement to SMEs. Many also stressed the need for more effective exploitation and dissemination of results.

48. Many of the recommendations of evaluations have been incorporated in later programmes, with the aim of improving effectiveness and value for money. In FP4 for example, changes made included stronger encouragement of SME participation through granting awards for feasibility studies and for research to be carried out on behalf of groups of SMEs by third parties. Greater emphasis has been given to the dissemination and exploitation of results through the requirement to submit a plan for the exploitation of results as part of the application process and the decision to devote 1 per cent of the funding of FP4's specific programmes to dissemination and exploitation activities. As well as dissemination measures such as publications and conferences, these will include means to stimulate the uptake of unused results such as demonstration projects, brokerage activities, and technology transfer and exploitation projects. A number of improvements were made to programme administration, notably through harmonisation and synchronisation of procedures across programmes. And as already mentioned, a more systematic and comprehensive system for monitoring and evaluation was introduced in FP4, reflecting UK pressure for more rigorous and effective means of reaching adjustments on programme effectiveness and impact.

49. Many of the changes have been useful though in some cases the impact is not yet fully felt. It is evident however that there remains scope for still further improvements in many aspects of the programme, to achieve fully satisfactory effectiveness and value for money, as the comments in this note, and the UK position paper on FP5, make clear.

Impact on sectors

50. Since the framework programmes are concerned primarily with the development of generic technologies of wide application, it is not possible meaningfully to identify the impact of EU RTD on individual sectors. The small scale of EU RTD in comparison with the aggregate expenditure of member States on RTD accentuates this. In addition, it is clear that there are many significant influences on the innovation process, of which investment in RTD is only one.

51. Nevertheless a number of examples of the contribution of EU RTD to developing technologies in key areas for competitiveness can be quoted. In the IT field, for example, the major EU effort in developing silicon technology through the Framework Programme IT programmes has helped European semi-conductor companies, including British ones, retain market share against fierce competition from the US and Japan; the UK company ARM, exploiting EU funded results, has licensed embedded microprocessor designs across the world; EU supported advances in high speed computing and parallel processing have brought improved techniques for large scale data processing; and EU support for advanced IT applications has benefited manufacturing industry in a range of sectors as well as private and public sector services. Discussions with industrial participants in the EU Industrial and Materials Technologies programme support the generally positive view of its contribution given by evaluations. One specific example is the significant reduction in car body weight achieved through advances in materials development and manufacturing and design technologies. Another is the development of improved dying processes for the textiles industry bringing quality improvements and reduced costs.

52. There have been significant achievements too in other areas of the programme. For example the EU Biotechnology programme contributed significantly to the funding involved in sequencing the yeast genome. This is the first complete DNA sequence from a higher species and will allow advances in the understanding of the basic mechanisms of life in higher cells. As well as advancing research into human health, the findings will benefit food processing, other industrial processes and the pharmaceutical industry. As an example from the EU Biomedicine programme, a UK led, EU supported, collaboration has led to a standardised approach to the monitoring of CJD in Europe and added significantly to understanding of the disease. Its findings provided a solid basis for establishing the existence of a new variant of CJD earlier this year.

53. The value of some other programmes is more difficult to assess, particularly in the absence of clear output data. For example, in the agriculture and fisheries area, the wide variety of regional needs within the Community has led to the creation of very broadly structured programmes which encourage scientific innovation but are less effective in meeting the objective of underpinning Community policy. Because many member States already have substantial domestic research programmes in these sectors, there is also scope within the EU programmes for making greater use of the most cost effective mechanisms for co-ordinated research (eg concerted actions and thematic networks), thereby directing research towards the common problems and priorities of member States.

JOINT RESEARCH CENTRE

54. In FP4, as a result of strong UK efforts, the JRC was obliged for the first time both to compete for a specific proportion of its funding, to ensure that its RTD activities were complementary with corresponding specific programmes, and to work towards a clearer customer-contractor relationship in all its activities. The JRC has made some progress but still needs to go much further down this road. There has been a good deal of support and encouragement from other member States for our view that the JRC should win more of its funding competitively.

55. The UK position paper on FP5 proposes that the JRC should build on these first steps. It suggests that the JRC should be required to obtain 80 per cent of its funding from customers over the life of the programme either competitively (from specific programmes or from contracts for third parties) or, in respect of non-competitive work done at the request of a specific customer in another DG, through explicit and costed customer/contractor relationships. As a matter of principle, the UK believes the JRC should improve its performance in current core areas before developing any new areas of competence.

56. Through its representative on the JRC Board, the Director General of the Research Councils, Sir John Cadogan, the UK has pressed for a number of changes to the working practices of the JRC institutes which, if fully implemented, would bring new discipline to the running of the JRC. Amongst the issues currently under discussion are the introduction of institute performance indicators, which would provide an additional monitoring tool for the Board with which to measure the transition of the JRC towards a more competitive approach; the establishment of industry advisory boards to enable an industry input at the earliest level in the development of JRC work programmes; and the need for JRC institutes to have closer co-operation with relevant specific programme committees.

57. Major forthcoming issues for the Board to consider include the future status of the JRC. In our view, the JRC needs to have the flexibility of agency status to perform efficiently and competitively in the areas where it is strong and to reorientate its activities where it does not have sufficient expertise.

COHESION

58. The framework programmes make a valuable contribution to the EU's cohesion objectives. The most effective strengthening of the scientific and technological capabilities of the EU's less favoured regions (LFR) will arise through their participation in the highest quality RTD. The 1996 Commission Annual Report on RTD indicates that the LFRs are active participants in the programme. Their researchers are involved in 46 per cent of FP4 projects and they provide 14 per cent of the total number of participants. The cohesion benefits of projects are legitmately included among the factors considered in the selection process. Even then, scientific merit remains paramount.

59. Strengthening the research infrastructure and the supply of trained scientific manpower are prime concerns of the less favoured regions. The EU's main instruments for achieving these however are the Structural Funds: within the programmes through which member States use these funds, substantial sums here been allocated for S&T support. It is important that framework programme priorities are not distorted for this purpose. Within the framework programme, LFR interests in this area are taken into account in the Training and Mobility of Researchers (TMR) programme, under which TMR fellows from LFR may receive grants to carry out further research in their region of origin. Researchers from LFR participate strongly in the TMR programme, accounting for about 25 per cent of TMR fellows appointed in FP4 so far. The "third activity" of the framework programme, which is concerned with the dissemination and exploitation of results, and the European Regional Development Fund, both measures to promote regional innovation and technology transfer strategies and projects.

SMEs

60. We recognise that SMEs have an important role to play in shaping and supplying the technology needs of the EU but that, because of their size, they face greater barriers to participation in the framework programmes than do larger organisations. Most of the specific programmes in FP4 contain Technology Stimulation Measures (TSM) to encourage SME participation. These consist of Exploratory Awards, which cover up to 75 per cent of the cost of preparing a complete research proposal, and Co-operative Awards which are intended to enable groups of at least four SMEs with little or no RTD capacity to solve technical problems by engaging a third party to carry out research on their behalf. UK SMEs have been particularly successful in obtaining TSM funding; the number of UK SMEs participating in the main programmes of FP4 is also encouraging.

61. The Government would like to see a broadly similar level of special provision for SMEs in FP5 as in FP4, but does not wish to see a separate SME programme. While the framework programme can make a useful contribution to Community SME policy, its priority must remain the quality of EC funded RTD. It is in the SMEs' interest, as well as helping to secure research of the highest quality, that SMEs should be encouraged to work in European consortia with larger companies, adding the user dimension to projects and obtaining the benefits of collaboration with larger partners in the supply chain.

COMPETENCE OF THE COMMISSION TO ADMINISTER THE PROGRAMME

62. The Commission adminster the programme in a professional, thorough manner, using well qualified staff of generally good calibre. Their commitment is not in question. At any one time they administer several thousand project contracts, far more than any other EU activity. The costs of programme administration are however high, with an average of 8 per cent (range 5-14 per cent) of programme budgets set aside for

administration. Though the Commission themselves claim that their costs compare well with those of similar organisations in member States, comparable costs for UK Research Councils are well under 5 per cent and are subject even then to continual downard pressure. To some extent, the Commission costs reflect the inherently high costs of managing an international civil service and the inevitably high costs of managing multinational projects. Nevertheless, while some improvements have been made in FP4, the slowness and complexity of selection and project management procedures compound costs, as well as causing frustration and delay for applicants. Factors outside the control of the units directly responsible for programme administration, such as the lack of delegation in Commission procedures for financial approvals, also lengthen processes for no added value. Poor co-ordination between different Commission Directorates-General reduces programme effectiveness and makes for sub-optimal integration of RTD and other Community policies.

63. As mentioned in paragraph 12 above, there are many specific aspects of programme management that need improvement. The Commission review of management procedures has proposed action to tackle a number of the problems. The UK will be watching the implementation of these recommendations closely. Nevertheless it is clear that there is a long way to go in achieving fully acceptable standards of efficiency and transparency and to address the broader problems that the Commission's review does not cover, for example internal delegation within the Commission and improved intra-Commission co-ordination.

64. The UK paper also indicates that there may be scope for more extensive contracting out of programme management, both to relieve pressure on the Commission's resources and to benefit from private sector expertise. Recent initiatives in devolved managment in FP4 may offer some helpful models for the future.

Length of Framework Programmes

65. The length of framework programmes needs to achieve a balance between the need for stability and continuity on the one hand, and for proper accountability and responsiveness to changing needs on the other. Given the immense effort that negotiation of a programme constitutes, involving a two and a half year run-up to a new programme, the UK would if anything favour a slightly longer programme, say five years instead of four. A shorter programme would imply less stability for the research community and be likely to mean starting the next round of negotiations as soon as the current programme began.

66. Accepting a longer programme would depend, however, on its embodying adequate flexibility to respond to new needs and new scientific developments, but without losing or weakening member state control. The UK believes that a well-planned programme should be able to provide such flexibility. The formal Council decisions for each specific programme should provide clear, well focused objectives, but avoid too much detail, which is better left to the underpinning work programmes which give practical effect to the decision.

67. These work programmes form the basis for the calls for proposals to which researchers respond. They can be regularly reviewed to reflect changing market needs or technological advance. This is the practice already in a number of FP4 programmes, although the extent of the scope for adaptation depends on the nature of the relevant decision. Reviewing and adapting work programmes represents a quick, flexible response to new needs and avoids the delays and complexity of a further legislative process. It also ensures sufficient control for member States through their membership of the programme Management Committees which are responsible for approving and amending work programmes, and keeps the RTD within the broad framework agreed by Council and the European Parliament.

68. The evolution of work programmes is to be preferred to alternative approaches such as untargeted programme lines or holding back a proportion of funding in a 'reserve'. Experience of 'reserve' funding in FP3 and FP4 has not been encouraging. It has proved problematic to reach agreement on the need for additional funding or how the criteria specified in the relevant Council decisions should be applied.

Impact of Allocation of Funding for EU RTD and UK Researchers

69. As explained in the initial paragraphs of this paper the process of allocating public expenditure in the UK takes account both of domestic and EU spending. When public expenditure is under great pressure, this is a necessary discipline. The "attributions" process is the means by which EU expenditure is brought to bear on departmental budgets, though there is no automatic relation between the potential reduction in a department's budgets attributable to EU RTD expenditure and its domestic S&T programmes, since Ministers can press the case for restoring potential reductions or reallocate resources from elsewhere. The process sharpens the assessment of priorities and provides an incentive to get the very best out of both EU funded and domestic RTD.

70. This incentive operates in several ways. EU funded RTD programmes create major opportunities for UK researchers which they have not been slow to exploit. As described above, they have participated vigorously in successive framework programmes and won valuable amounts of funding. The UK research community has also sought very actively to influence the shape and content of framework programmes at the

negotiation stage to reflect UK interests and has contributed significantly to success in getting UK S&T interests reflected. There is no reason to think that the net effect of EU research has been to the disadvantage of UK researchers or research priorities.

CONCLUSION

71. Overall, the government believes the framework programmes have a positive role to play, provided that they are targeted more sharply at results that would benefit EU industry in relation to its competitors into the next century and provide better focused support to key areas of EU policy; and do so demonstrably cost-effectively. Real strides have been made since the inception of the first programme in improving relevance, effectiveness and managerial efficiency, but there is still much to be achieved. We shall pursue the aims set out above, both in relation to the current programmes and in the negotiation of its successor. While it is unlikely that we shall be able to achieve an FP5 which matches the UK's interests in every respect, we have a strong record of positively influencing the development of EU RTD and achieving key UK objectives. We intend to continue to do so in future.

Office of Science and Technology
Department of Trade and Industry
14 October 1996

UK POSITION PAPER ON A FIFTH FRAMEWORK PROGRAMME

SUMMARY

The UK considers that the fifth framework programme (FP5) should build on the most effective features of the fourth framework programme (FP4) and the Commission's task forces. However FP5 should be more clearly focused on research in support of the overall aims of enhanced competitiveness and support for EU policies, including those which bear on quality of life. This paper outlines a possible approach to achieve this, together with more effective delivery of the research and technological development (RTD) priorities that need to be tackled at a European level.

KEY PRINCIPLES

The UK suggests the following key principles should guide the development of FP5. It should:

- be directed towards the key Treaty aims of enhancing competitiveness and suppporting EC policies;
- be of a scale affordable;
- support objective-driven applied strategic research of the highest quality;
- have clear and testable objectives;
- offer greater involvement to potential users of FP5's output; and
- in accordance with subsidiarity, only support RTD where activity at a European level clearly adds value that would not otherwise be obtained.

OBJECTIVE-ORIENTED THEMES

In order to define clear objectives for FP5, the UK suggests that the framework be elaborated in terms of a number of *thematic objectives.* The UK reaches no definitive view on what these themes should be, but offers (see page 14) some illustrative examples. It is suggested that, once each objective has been identified by the Commission and member states, *an advisory group* should be set up for each to provide an effective user input to defining the RTD needed in pursuit of each objective. These RTD needs would then be incorporated into specific programmes. The groups would also have a role of strategic oversight during the programme's implementation. Reflecting the customer interest, these advisory groups would be drawn from industry, member states, the Commission, (including, where appropriate, policy DGs) the scientific and other relevant interests. They would be expected to consult widely.

THE SPECIFIC PROGRAMMES

Rather than propose specific programmes for each individual thematic objective, the UK suggests the *specific programmes are organised primarily on the basis of the key technologies* (eg information technologies, environmental technologies) which would deliver the objectives. The UK suggests that these technologies should not be objectives in their own right but rather be viewed as a means of achieving FP5's objectives. Illustrative examples of six possible specific programmes are given on page 15. Each specific programme would then direct its research toward contributing to the relevant thematic objectives (see annex A for an illustration of this approach). These would need to be supplemented by a limited number of policy related programmes to deliver specific EC policy and support objectives (eg agriculture, transport). Overall, this would lead to a smaller number of specific programmes and should aid management efficiency.

The specific programmes would operate similarly to existing specific programmes in FP4, issuing calls for proposals, promoting networks etc. They should be overseen by regulatory committees composed of member states' representatives. The mechanisms for delivering the programme objectives, including the promotion of enhanced co-ordination between member states's own RTD activities as well as framework financed RTD projects and networks, should reflect the advisory groups' advice. In addition to their formal regulatory role these committees should also have a role in ensuring the priorities of the advisory groups are reflected in the research programme. Robust and effective mechanisms for the monitoring and evaluation of FP5 will be key features of an output driven programme.

OTHER ACTIVITIES

The UK considers that there is a good case for continuing separately to fund an international co-operation programme and to support researcher training and mobility. In FP5, the latter programme should, however, seek more actively to encourage industrial participation. There is also a case for the separate funding of the minimum of essential machinery to encourage the dissemination and exploitation of RTD results. More generally, however, the UK believes that these aspects should be given increasing emphasis within the RTD programmes themselves.

In addition, the paper outlines a number of more detailed UK aspirations for the next framework programme relating to more effective and efficient administration; tighter focusing of programmes to reduce oversubscription; clearer and more consistent procedures of evaluating and selecting projects; a better understanding of those measures which will assist the involvement of SMEs; building on the steps to require the Joint Research Centre to offer truly competitive services; and ensuring a complementary relationship with other programmes such as Eureka and COST.

The paper is presented to the European Commission as a contribution to the development of its thinking on a possible fifth framework programme. The UK will look forward to the further discussion of these issues in the months to come.

The UK believes that there continues to be a need for a European programme of research and technological development (RTD). Considerable experience has been gained through the earlier framework programmes which has enabled them to become progressively more effective at addressing the RTD needs of the Union. The UK believes that the fourth framework programme (FP4), coupled with the experience of the introduction of task forces in 1995–96, provides a firm foundation on which a fifth framework programme (FP5) can be based. This paper seeks to outline the UK's views on the structure and management of an FP5 which would build on the strengths of FP4 to provide an even better focused and more effective programme directly relevant to the RTD needs of Europe in the new millennium.

FUNDAMENTAL PRINCIPLES

2. The UK believes that the shape, content and management of any fifth framework programme of research and technological development should conform to the following fundamental principles:

- (i) it must seek to deliver results in respect of the two key roles described in the Treaty, ie **enhancing the competitiveness of European industry** and **supporting European policies;**
- (ii) it should be of **a scale affordable** within the constraints of the EU budget;
- (iii) it should, like the fourth framework programme, focus on **objective-driven applied and strategic research and technological development,**[1] including well-justified validation and demonstration projects (eg pre-competitive system demonstrators) which are designed to produce outputs which can be disseminated to others. It is not the place of FP5 to fund the development of near market products, processes or services;
- (iv) clear, testable **objectives** must be established for any activities which are carried out under the framework. Every activity within the framework should clearly derive from a **customer** or **user**;
- (v) the framework must take full account of the requirements of **subsidiarity**. FP5 should only fund RTD which can only be done, or can only effectively be done, at European level and where **value is clearly added** by carrying out such RTD at that level;
- (vi) as provided for in Article 130h of the Treaty, the framework should provide a means for member states more effectively to **co-ordinate RTD activities** across Europe, reducing overlap and

---

[1] . . . applied research (ie original investigation undertaken in order to acquire new knowledge directed primarily towards a specific practical aim or objective) including research which may not have yet advanced to the stage where eventual applications can be clearly specified.

duplication and allowing member states to rationalise their priorities where appropriate. It should also encourage effective coordination between the sub-components of the programme itself; and

(vii) it should pursue its RTD objectives in the most cost effective way. Where on this basis it is appropriate to fund RTD projects directly it should fund only **the highest quality RTD** relevant to programme objectives.

3. To give full effect to the principles above, FP5 needs to show a stronger sense of priorities than its predecessors and to give a clearer voice to the potential users of the programme's outputs. This note describes an approach which, building on the best features of FP4 and the task force model, is intended to achieve this. Its key feature is the clearer definition of the distinct roles of the customers (industry, member states, policy DGs) of the research and the providers (ie researchers, funded through Commission contracts or otherwise).

An Objective Driven Approach

4. The UK believes that the programme should be organised primarily around objective driven themes which seek to address the medium-term technological needs of European industry, to contribute to improvements in quality of life, and to support European policies more broadly. Such an approach would increase the effectiveness of the programme, maximise the impact of EU RTD spending and allow the EU and member states better to demonstrate the purpose and value of the programme.

5. Taking these points together, the UK considers that FP5 should seek to implement the principles outlined in paragraph 2 above through an objective-oriented programme which exploits the best features of the task force approach—in particular engaging users, concentrating on outputs and deploying appropriate expertise—and which ensures that all RTD support within the research activity clearly derives from an agreed set of key European priorities. Specifically, the UK considers that the programme should be constructed and managed at a strategic level on the following lines:

(i) member states should be invited in CREST to consider the objectives they would wish to see pursued as FP5. They should also identify the technology or policy based RTD programmes through which these objectives would be pursued. The Commission should then come forward to the Parliament and the Council with a proposal, based on the advice of CREST and other bodies as appropriate, for a European Community and European Atomic Energy Community framework programme. This programme would consist of a matrix outlining the chosen objectives, with budgets allocated to each, and the small number of RTD specific programmes through which they were to be pursued;

(ii) for each objective in the framework, an advisory group should be set up. The purpose of the advisory groups would be to serve as a proxy customer, providing the Commission and the Council with advice on the RTD needs relevant to each objective. They would be expected also to advise on the application of the budget attributed to each objective, indicating the proportion that should be devoted to each relevant specific programme to achieve those RTD needs. They should also specifically consider and advise the Commission and the Council on other factors relevant to achieving these objectives, in particular on the mix of research project funding, network-funding and/or increased co-operation which will be most cost effective;

(iii) based on this advice, essentially by aggregating the RTD components of individual objectives to form technology-specific delivery programmes, the Commission would bring forward proposals for the specific programmes and their associated budgets. Following consultation with the Parliament, these specific programmes would be adopted by the Council. They would thereafter be subject to the oversight of regulatory committees. Alternatively, in some policy areas it may be most appropriate for some or all of the relevant objectives to be pursued through an interdisciplinary programme under the guidance of the relevant policy directorate, rather than through the technology-specific delivery programmes;

(iv) the advisory groups would remain in existence to review at an aggregate level the research undertaken in support of each objective and to offer further advice, as appropriate, to the Commission and regulatory committees on later calls for proposals. Their primary role would be to provide a strategic oversight of the technological progress being made towards the thematic objectives of the framework programme. They would have an important part to play in ensuring that the programme evolved as necessary during its lifetime to respond to new and/or changing needs.

6. To ensure technological coherence and to avoid fragmentation, it would be important strictly to limit the number of technology/policy programmes. The UK considers that it should be possible to deliver an objective-orientated framework programme through a maximum of six technology specific programmes, as shown in Annex A, together with a small number of policy related programmes. In most cases, the specific programmes will contribute to the achievement of several objectives; equally the pursuit of each objective will usually be dependent on more than one specific programme. The approach is discussed in further detail in paragraphs 21-24. A diagram outlining the process for deriving the specific programmes is shown at Annex B.

ADVISORY GROUPS—MEMBERSHIP AND WORKING METHODS

7. The membership and working methods of the advisory groups should be tailored to the needs of specific objectives. The important thing is that they represent an effective user voice for the outputs that are being sought in support of each objective. They therefore need to bring together the key users of RTD relevant to a particular objective, together with member states and the Commission, at a formative stage to ensure that user needs become the primary basis for defining specific programme content and that, as FP5 is implemented, the programme evolves in the light of progress being made in pursuit of the objective or other changes.

8. The membership of an advisory group should be relevant to the objective in question but should in all cases include users of the RTD output who are scientifically competent to assess the technological needs and capabilities in the relevant area, member states, and the Commission (in its role as research provider and where relevant as policy maker). Members, other than representatives of the Commission, should be nominated by member states. Members would be likely to include:

- in the case of industrial competitiveness objectives, representatives of industry or industry associations (and other users of the research output) together with officials from member states, and the Commission;
- in the case of objectives supporting EU policies, representatives of the DGs responsible for the policy areas concerned, as the primary customers, representatives of member states, and representatives of other relevant interests. In this way policy DGs can be given a much stronger influence than at present on the RTD programmes intended to serve their needs;
- in some cases, objectives are likely to embrace policy, competitiveness and quality of life issues; indeed such breadth is essential if new and critical issues are to be addressed. In such cases, members would include representatives of the public agencies with relevant policy responsibilities in member states, of industry as appropriate, and of DGs with relevant policy responsibilities.

9. Advisory groups would be free to determine their working methods best to suit their circumstances. Some advisory groups may wish to set up sub-groups to deal with specialised areas. Membership of sub-groups should reflect the task in question. A predominantly industry oriented sub-group, building directly on the approach adopted for the task forces, might be appropriate in some cases.

10. The advisory groups would be required to consult widely. They will need for example to seek the views of the scientific community, particularly where S&T is fluid and fast advancing and may only partly be able to be related to specific end-user needs. In the case of policy-led programmes, it would be appropriate to consult the relevant policy Council.

Co-operation and co-ordination

11. In some cases, advisory groups may take the view that there is scope for achieving objectives by using the framework programme to promote enhanced co-operation between member states' own RTD activities.

12. This may be particularly true of objectives relating to the furtherance of EU policies in a number of fields. In transport and agriculture for example, national programmes are comprehensive and may address largely similar issues to EU programmes; greater benefits may be gained from using EU resources to link and add value to national programmes than from major new EU initiatives. The need for such concertation is particularly acute in the case of the RTD needed to underpin implementation of EU legislation. There are a number of instances where several member states have independently conducted research in parallel to acquire the technical basis needed to put EU directives into effect. The case for avoiding such duplication is self evident.

13. The activities being undertaken in the Ad Hoc Advisory Committees established in pursuit of the Council's decision of 9 June 1995 on RTD co-ordination are making a beginning with this task. Its further development in FP5 is very much to be encouraged.

OBJECTIVES

14. The concept underlying the objective driven approach is that the programme's outputs should be genuinely responsive to Europe's needs. In the competitiveness area objectives should reflect the technological needs of future markets, especially in areas where RTD is essential to maintain an existing strength in Europe or where RTD can help Europe to achieve a position of strength in key future markets. Exceptionally, in areas where the underpinning S&T is developing very rapidly, such as biotechnology, there should also be scope to include areas even if the most likely end-users of a final product cannot be specified from the outset. In the policy area, all objectives should support a clear EU policy need or one relevant to several member states. The number of objectives needs to be kept reasonably limited as a stimulus to prioritisation and to keep the concept manageable.

15. At this point it is premature to propose a full or detailed set of objectives that might form FP5. The objectives set out overleaf and described in more detail Annex A are examples only. They are included solely

for the purposes of illustrating the approach in practice. They do not represent the UK's considered priorities for the thematic objectives to be included in FP5. More extended consideration will be needed to establish these. In addition, some areas of policy or industrial interest have not been addressed in these examples. The UK would want to propose further themes, as the model to be proposed by the Commission becomes clearer, for example in the field of health.

Possible Examples of Objectives for FP5

Intelligent business and administration: innovative use of information systems for competitiveness in business and public services

Agile enterprise: developing the responsive, adaptable business

More efficient, clean and sustainable processing industry: advanced manufacturing and processing with least environmental impact

Energy for tomorrow's Europe: Cheaper, more secure energy for Europe's industry and citizens

Better construction: delivering better value to construction industry customers

European aeronautics for world markets: technologies for the safer, more efficient, more environmentally friendly plane

Towards tomorrow's car: technologies for the environmentally friendly, more efficient vehicle

The informed citizen: empowering the citizen through easier access to information for culture, leisure and self-development

Molecular and bio-technologies for competitiveness and quality of life: innovative products, processes and treatments

Sustainable farming and fishing: underpinning European policies and regulations

Sustainable transport: safe, environmentally friendly transport systems for accessibility, mobility and choice

Supporting EU environmental policy: to support the implementation of the European Community Programme of Policy and Action in Relation to the Environment and Sustainable Development (AP5)

Strengthening the single market: developing the European test and measurement infrastructure for makers and users of standards.

16. These descriptions are intended to exemplify some of the areas in which the Framework Programme might most fruitfully contribute to competitiveness, quality of life and support for EU policy. Many of them have been identified in the UK's Technology Foresight exercise, which was based on wide and deep involvement of the academic and business communities and government. Many of them reflect two fundamental drivers for change in society: the need for sustainable development in its broadest sense and the need to capture and capitalise on the benefits of the information revolution.

17. It should be noted that key underpinning technologies such as IT will be relevant to most objectives, as will improved understanding of economic and social driving forces and impacts. Likewise the environmental dimension will need to be considered under most objectives, and space technology, marine sciences and technologies and other disciplines will have a contribution to make in a wide range of fields. These technologies will contribute to the achievement of the framework's objectives, however, rather than form objectives in their own right.

18. One issue relevant to many themes is risk analysis. This should form an essential component in better EU policy making and implementation. More consistent and rigorous use of risk assessment techniques and of cost and risk/benefit analysis, based on common understanding, is needed to promote sound legislation with an appropriate balance of safeguards and compliance costs.

19. A higher profile should be given to risk analysis throughout the programme. Wherever relevant, specific programmes should embrace the research needed on relevant risk issues, for example those specific to policy development in health, transport, food, energy and the environment. There would be advantage in the Commission developing a centre of expertise (as part of the administrative machinery described below) both to support the advisory groups in identifying these needs and to act as a source of technical support as FP5 proceeds.

FUSION

20. In developing themes, it will be important to assess the contribution of nuclear fusion research to the objectives of the framework programme. The future of fusion is currently under review. The UK attaches importance to seeing a thorough and impartial assessment of fusion research before decisions needs to be taken on further funding through FP5.

IMPLEMENTATION OF THE PROGRAMME

21. The Commission will need to consider how best to administer and manage a programme on the lines described above. Adaptation of existing structures, and indeed of some aspects of Commission working culture, will be needed. Different procedures will apply to the programme agreed under the European Atomic Energy Community Treaty from those that will apply to the programme agreed under the Treaty of Rome. To an extent, the best form of overall organisation cannot be identified until FP5's objectives are clearly known.

22. As discussed in paragraph 5 (iii) above, some policy RTD objectives might best be delivered wholly through the commissioning of interdisciplinary research under the close guidance of the relevant policy Directorate General. In such cases, exceptionally, it might be appropriate for the advisory group to become the regulatory committee. For other areas, however, the UK considers the following approach would be most appropriate.

(i) it would be wrong to attempt to implement these objective driven programme through separate organisational structures and management arrangements for each objective. Such an approach would lead to excessive fragmentation, new boundary problems between specific programmes and to a loss of coherence in the development of underpinning technologies;

(ii) accordingly these aspects of the programme would be best administered through specific programmes organised (in most cases) on technology, rather than objective driven, lines. These would administer the components of the themes relevant to each scientific or technological discipline, implementing work programmes to meet the specified RTD needs. In this way the specific programmes would provide for the development of the generic technologies that will deliver the objectives of the programme;

(iii) the specific programmes would then be implemented as in FP4: calls for proposals would issue, proposals would be evaluated by independent experts, short lists would be proposed, contracts would let, and projects would be monitored and evaluated;

(iv) the specific programmes would be overseen by regulatory committees composed of representatives of member states. Their role would be to ensure that the Commission was delivering the Council's decisions on the specific programmes and, within those decisions, responding to the priorities specified by the advisory groups. In particular, they would play a formal regulatory role in respect of calls for proposals, evaluations, shortlisting and contract management;

(v) the regulatory committees' role would differ from that of the advisory groups who would be monitoring at a strategic level the RTD being undertaken in support of individual thematic objectives. Regulatory committees would report from time to time to the advisory groups on the research undertaken in pursuit of the relevant objectives. It would then be for the advisory groups to take an overall view on the direction of the specific programmes, and as appropriate to issue advice on future calls for proposals. The advisory groups would thus provide the strategic oversight, and feedback to member states, of the Commission's delivery of the objectives.

ADMINISTRATIVE STRUCTURE

23. The UK does not have a fixed view of the number of technology or policy based programmes that should administer the programme or of the S&T disciplines they should cover; much will depend on the objectives agreed for FP5 and the S&T content these generate. The fewer the units, however, the less scope there would be for overlaps and consequent problems with coordination. The units should not be so large as to be unmanageable. It would be surprising, however, if the appropriate number were not a good deal fewer than the 18 specific programmes of FP4. As indicated in paragraph 6 above and Annex A, we believe it should be possible to deliver the framework programme through six discipline related specific programmes and a small number of policy related specific programmes. The six discipline related programmes we envisage are:

— information and communication technologies
— life sciences and medical technologies
— energy technologies
— engineering, chemical and material technologies
— environmental and marine sciences and technologies
— social and economic sciences.

24. Member states need a mechanism which gives them an adequate degree of assurance that the programme is managed well and that decisions are taken on the basis of transparent and fair criteria which place an appropriate premium on the quality of the RTD to be carried out. In FP4, regulatory committees of member state representatives serve this purpose. But their influence is limited and the value added is questionable. In the model described above, member states' primary vehicle for strategic oversight of the

objective driven programmes would be the advisory groups. If such a mechanism was in place, there might be scope critically to review the role of regulatory committes to identify how member states could best achieve the degree of assurance they need over the management of programmes most cost-effectively.

MONITORING AND EVALUATION

25. The UK attaches particular importance to the five year retrospective evaluation of framework programmes provided for under Article 4.2 of Decision 1110/94/EC, which is due for completion by Spring 1997. The evidence this evaluation will provide of the tangible impact of EU RTD programmes, and value for money achieved, will provide valuable lessons, which the UK will expect to see put into effect in FP5.

26. There will need to be built into FP5 robust and effective mechanisms for programme monitoring and evaluation, to allow early feedback on programme effectiveness. The new monitoring and evaluation mechanisms incorporated in FP4 should be vigorously implemented, reviewed at appropriate points and adapted or strengthened as necessary. Member states should be able to input directly to the monitoring and evaluation process and should have access to all the information collated by external evaluators.

SCALE OF FP5

27. The scale of any fifth framework programme will need to be considered carefully in the light of the new financial perspectives that will be set following the Inter-governmental Conference. On the basis of the analysis above, however, the UK considers that there is no case for an increase in the present level of the EU's funding for RTD. In some areas it may be possible to reduce costs, eg where objectives can be met more effectively through closer co-operation between national programmes rather than through additional funding at the European level. Accordingly, the overall budget for FP5 should not be greater than that for FP4.

28. Within that total, the appropriate allocation of resources will reflect the RTD needs identified for each thematic objective through the processes described above. Among these allocations, the UK would expect FP5 to spend less on nuclear safety research than FP4. In addition, the UK would wish to see a higher proportion of funding in general being devoted to exploitation and dissemination, and the share of funding going to training and international cooperation being at least maintained.

INFRASTRUCTURE

29. In the course of developing proposals for specific programmes, the advisory groups envisaged above may conclude that there is a need for specific infrastructural developments (eg in the medical field for animal research and clinical trial facilities; in the environment field the development of centres of excellence linking national facilities in, for example, climate and ocean modelling and support facilities such as research aircraft). The presumption should be that these would best be developed bi- or multi-nationally on the lines of existing models, ie outside the framework programme. But where, exceptionally, it is considered that these are best supported through the framework, the UK regards it as important that such facilities should not have an open-ended life. They are most likely to meet customer needs and deliver value for money, if they are funded on a short-term, contractual basis, are based on and managed in the context of existing national facilities, and are subject to stringent periodic review.

INTERNATIONAL COOPERATION

30. The UK agrees that the EU's perspectives in RTD need to extend beyond Europe. As global economic integration proceeds, the EU's industries are increasingly planning their strategies on a world basis. Many advanced technology sectors would welcome scope in FP5 to collaborate with partners in other industrial economies, where inward technology transfer would be beneficial to the European partners. Greater openness, subject to suitable safeguards, would increase the attractiveness of the programme to potential leading edge participants. The UK would support the opening of the programme in this way on a project by project basis where there is mutual advantage to all those involved in the collaboration.

31. The EU also has a role to play in strengthening the scientific and technological capabilities of key groups of neighbouring states, particularly the associated states of Central and Eastern Europe and the New Independent States of the former Soviet Union. Within the framework of Barcelona, cooperation with the Mediterranean partner states will also be important, and, in line with the EU's development cooperation policies, so will cooperation with developing countries. FP4's programme for international cooperation has political as well as scientific significance and should be retained in FP5 as a separate entity, though its administrative links with other programmes should be improved. It should receive the same level of funding in FP5 as it has received in FP4.

32. The key priorities for FP5 should be assisting the CEE associated states' preparation for EU membership, as outlined in Europe Agreements and in the pre-accession strategy agreed at Essen. The EU should promote particularly the CEE associated states' ability to participate in FP5 specific programmes.

COST projects might meet some of this need, and EU support for the COST mechanism should reflect this. COST provides a flexible and cost effective route for scientific and technical cooperation, and as such is a valuable adjunct to the framework activity. The UK would want the framework programme to provide continued central administrative support for COST but we would not want to see any significant increase in funding as compared with FP4.

TRAINING

33. The provision of a stock of scientists and technologists with high level skills and breadth of outlook is essential for Europe's continued scientific excellence and economic future. The training and mobility activities of FP3 and FP4 have made a very useful, and widely appreciated, contribution in encouraging skills development through complementary experience. Training and mobility activities should be continued in FP5, with an appropriate balance between the TMR programme and training undertaken in specific programmes, and together receive at least their current share of the overall budget. It is important that host institutions are fully recompensed for overhead expenses incurred in training fellows.

34. The UK believes, however, that there is scope to engage industry more actively in the TMR programme. It currently facilitates academic collaborations almost exclusively. Greater industrial involvement could be achieved both through encouraging industrial partners to act as hosts for students, to the benefit of both student and firm, and through academic placements of industrial researchers. Consideration needs to be given to ways of facilitating this involvement in FP5, building on the studies already under way in the Commission. The UK believes that a mechanism comparable to the UK Teaching Company Scheme could have a good deal to offer in this area.

DISSEMINATION AND EXPLOITATION OF RESULTS

35. Significant resources have been devoted to dissemination and exploitation in FP4 through both a specific programme under the Third Activity and through activities within the First Activity. 1 per cent of the total FP4 budget was allowed for this in the First Activity. Overall, we consider that 5 per cent of the FP5 budget should be allocated to the follow-through of research.

36. The bulk of the effort to secure effective dissemination and exploitation should be pursued through exploitation plans built integrally into project proposals and through measures more actively to pursue dissemination and exploitation under the RTD Activity. A proportion of this funding should also, however, be allocated to a separate activity to fund horizontal actions such as CORDIS and broader initiatives to stimulate innovation.

PROGRAMME ADMINISTRATION

37. Although real improvements have been made in FP4, there is a need for further acceleration and simplification of framework programme administration. This is still perceived as cumbersome and bureaucratic. The length, complexity and cost of the application process in particular remains a powerful disincentive to industrial participants and others. UK industry has made this point with great vigour.

38. There is scope for considerable improvement of procedures within the current system. In particular, the UK considers that much could be achieved through:

(i) clearer, more consistent and more timely publicity and advice to applicants. The criteria to be used in evaluating proposals, including policy criteria, should be made explicit and public from the outset. This will help to reduce the number of misapplications. Guidelines on allowable costs should be included in material made available to potential applicants, as should guidance on maximum costs where these are applicable. More effective use should be made of the Internet and the World Wide Web, on the lines of current practice in the ACTS, IMT and SMT programmes. The Commission should work more closely with member states to rationalise sources of information and advice on the programme, working through national structures wherever possible. Wherever possible, calls should be coordinated across directorates and Commission staff should be encouraged to pass on applications to other units if it seems more likely that they will achieve funding that way;

(ii) shorter timescales for project selection. Every possible step should be taken to achieve this. The UK would support the Commission undertaking an efficiency scrutiny of the existing arrangements to see whether, by means of process engineering, the procedures can be speeded up or shortened without weakening essential standards;

(iii) full transparency in the process of review by independent experts. Evaluation criteria should be subject to agreement in programme regulatory committees and made available to applicants. Where appropriate, these should include clear guidance both on the science quality criteria and on any other policy judgements which may be relevant to the decision. The names of those on evaluation panels should also be subject to review by regulatory committees for balance and competence. Better and earlier feedback should be given to unsuccessful applicants. Regulatory committees should not seek to second guess evaluation findings but should rather be tasked with oversight of the evaluation process throught the establishment of a quality assurance system;

(iv) a more consistent approach to contract negotiation and interpretation of the model contract. In addition, contract negotiations should focus primarily on value for money and avoid excessive amendment of the scale and scope of projects or of the consortia proposing them.

39. It is essential for the efficient management of the programme that budgetary and management powers within the Commission should be delegated more effectively. Too many decisions have to be taken collectively. This imposes unnecessary and unhelpful delays on the decision making process.

40. More user friendly administration needs to be accompanied by measures to reduce oversubscription. Tighter focusing of programmes is the best way to achieve this. At the same time, consideration also needs to be given to ways of reducing the cost of the application process to applicants. This is a huge waste of resources. One option might be to adopt a two stage application procedure. To establish the scope for this, current experience with two phase application procedures in FP4 (both pre-screening procedures and two step applications) should be evaluated, to see if they provide a model for more general use in FP5. The UK's initial impression is that the two step application process being piloted in the IT programme has produced good results. Any two step procedure will need, however, to provide worthwhile benefits overall if it is to justify the inevitably longer timescale. Its acceptance will also depend on adequate assurance that the first stage provides an effective, sufficiently rigorous, and sufficiently impartial filter.

41. More broadly, the UK recommends that the Commission contracts out of some aspects of programme management, both to relieve pressure on its own resources and benefit from private sector expertise, while maintaining access to information by the regulatory committees. The evaluation of the current AMICA programme may offer useful pointers in respect of the contracting out of programme administration to member states.

SMEs

42. While SMEs play an important role in innovation, it is evident that international collaborative RTD is appropriate for only a small fraction of the EU's SMEs. A degree of realism is needed on the extent to which it is desirable further to stimulate their participation in FP5; more emphasis could usefully be given to the other roles they could play in innovation.

43. Extensive measures have been taken in FP4, through technology stimulation measures for SMEs, including CRAFT, to encourage SME participation. The UK welcomes these although their impact has been reduced by uneven quality of implementation. They should be thoroughly appraised before any further measures to encourage SME participation are contemplated. Rationalisation of the Commission's support and information networks for SMEs is needed, and their better integration with national services.

44. SMEs will be most helped by overall simplification and acceleration of administrative procedures in FP5. It may also be fruitful to encourage SME participation through promoting supply chain collaboration and other forms of large/small firm partnerships, including subcontracting. Large firms should be further encouraged to participate in any CRAFT type scheme since they offer valuable support for SME partners.

THE JOINT RESEARCH CENTRE

45. In FP5, pressure should be maintained to ensure that the JRC budget funds only high-quality science, requested by customers, carried out as efficiently as possible. In FP4, the JRC was obliged to compete for a specific portion of its funding, to ensure its research activities were complementary with corresponding specific programmes, and to work towards a clear customer-contractor relationship in all its activities. The JRC is on course with the competitive targets but it is too early to trace any significant consequential improvements.

46. The UK considers these first steps should be built upon in FP5. In particular, the budget should be set in such a way as to require the JRC to obtain 80 per cent of its funding from customers over the life of the programme, either competitively (from the programme or from contracts for third parties) or through explicit and costed customer/contractor links to relevant policy DGs within the Commission. In addition, the UK believes the JRC should be made more accountable by strengthening structures to support the Board in its monitoring functions, for example through more frequent external evaluations of quality and efficiency, and through the creation of more formal links between the Board and the JRC's DG customers.

EUREKA

47. The EUREKA mechanism is directed explicitly at projects which are near market and aimed at specific products, processes or services. By contrast, as will be clear from the commentary above, while the UK would want FP5 to address more clearly and systematically the technologies which will underpin wealth creation and quality of life, we consider the funding available to FP5 will continue best to be spent on pulling through technologies of wide application for the future, rather than near market developments of more limited application. Accordingly, the UK considers that it would be inappropriate to divert FP5 funding to supplement or to replace the national or commercial funding of EUREKA projects. If a project which has been considered under the EUREKA mechanism subsequently qualifies within the terms of the specific programmes of FP5, receives a positive evaluation and is then chosen for funding, there is no reason for it to be excluded from funding under FP5. But the UK considers that, given the need for clear complementarity between the two mechanisms, it would be wrong for EUREKA projects to receive any form of preferential access to framework funding or for any part of the framework to be set aside for EUREKA projects as such.

Office of Science and Technology
Department of Trade and Industry
London

June 1996

Annex A

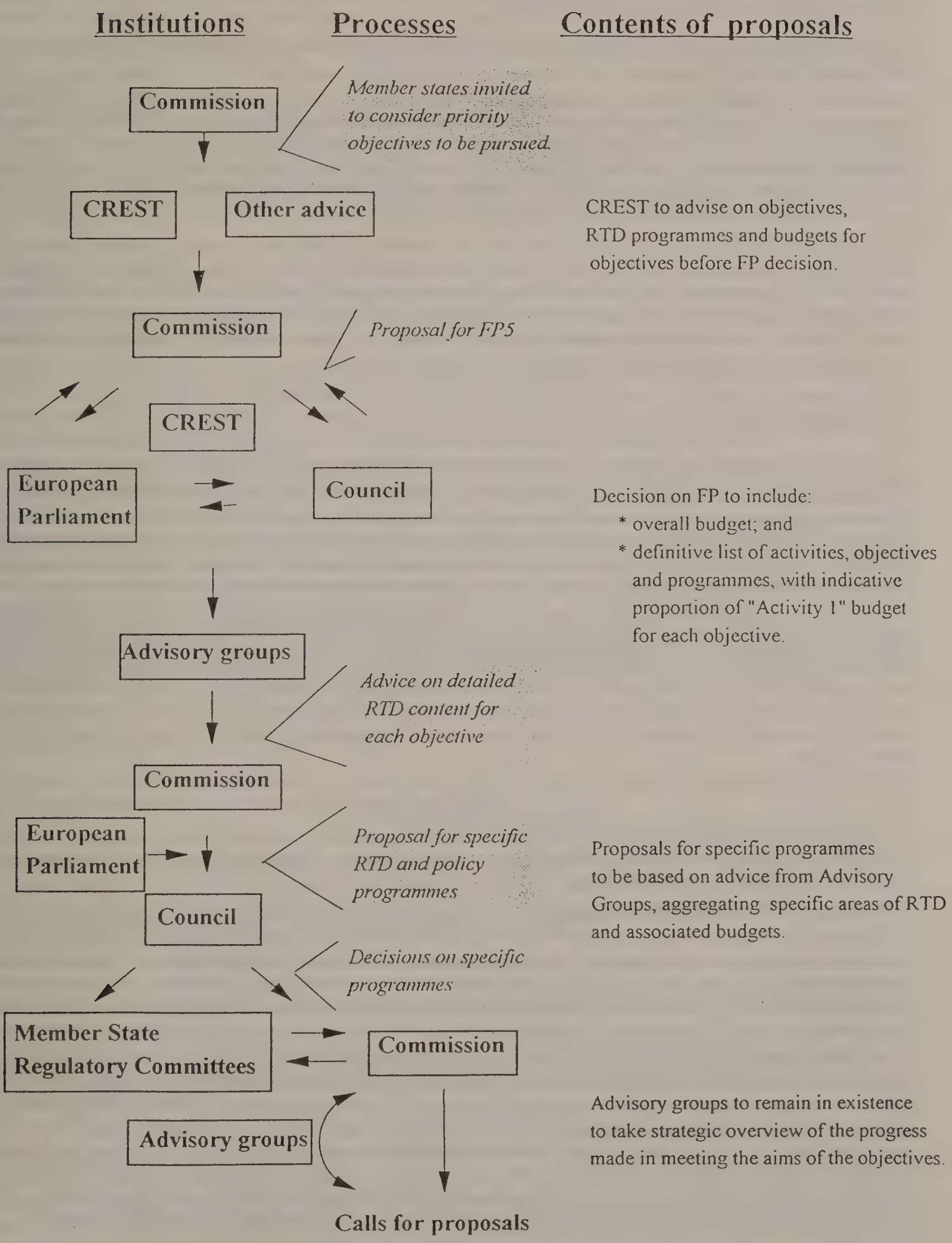
ongoing strategic oversight
by advisory groups →

delivery through specific programmes
monitored by regulatory committees ↓

	Thematic objectives															
	Intelligent business and administration	Agile enterprise	Efficient and sustainable processing industry	Energy for tommorow's Europe	Better construction	European aeronautics for world markets	Tomorrow's car	The informed citizen	Molecular and biotechnologies for competitiveness and quality of life	Sustainable farming and fishing	Sustainable transport	Supporting EU environmental policy	Strengthening the single market (standards and measurements)	etc	etc	etc
information and communication technologies	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓			
life sciences and medical technologies			✓						✓				✓			
energy technologies			✓	✓		✓	✓				✓		✓			
engineering, chemical and material technologies			✓	✓	✓	✓	✓		✓		✓		✓			
environmental and marine sciences and technologies			✓	✓		✓	✓				✓	✓	✓			
social and economic sciences	✓	✓	✓	✓	✓		✓	✓			✓	✓	✓			
Commission policy research units eg Agriculture, DGVI										✓						
eg Transport, DGVII											✓					

Annex B

Flowchart showing the decision making process for FP5


Institutions
Processes
Contents of proposals
Commission
Member states invited to consider priority objectives to be pursued.
CREST
Other advice
Commission
Proposal for FP5
CREST
European Parliament
Council
Advisory groups
Advice on detailed RTD content for each objective
Commission
European Parliament
Proposal for specific RTD and policy programmes
Council
Decisions on specific programmes
Member State Regulatory Committees
Commission
Advisory groups
Calls for proposals

CREST to advise on objectives, RTD programmes and budgets for objectives before FP decision.

Decision on FP to include:
- overall budget; and
- definitive list of activities, objectives and programmes, with indicative proportion of "Activity 1" budget for each objective.

Proposals for specific programmes to be based on advice from Advisory Groups, aggregating specific areas of RTD and associated budgets.

Advisory groups to remain in existence to take strategic overview of the progress made in meeting the aims of the objectives.

Annex C

EXAMPLES OF THEMATIC OBJECTIVES FOR FP5

1. Intelligent Business and Administration

Objective: Innovative use of information systems to raise competitiveness of business and public services in the Information Society.

Includes: Development and pilot applications of information systems, multimedia systems, datamining, and geographic information systems. RTD for components and peripheral systems, RTD for advanced communications networks, including a Space/satellite communications infrastructure. Security, IPR, and standards. Demonstrating, and encouraging effective use of the I&C infrastructure by private and public sector, eg electronic commerce, telematics for administrators, teachers, trainers and researchers. Improving management methods and quality. Human and social factors.

Rationale: Rapid development and convergence of information and communication technologies (I&CT), and increasing dependence on these for world-wide competitive advantage, require Europe to establish a sound I&CT infrastructure and systems to meet business and public sector needs effectively and efficiently. I&CT will be one of the world's largest industries by the year 2000 and Europe faces strong competition. RTD at the European level will bring synergy of existing strengths, shared knowledge and new capabilities in member states to raise the competitiveness of the whole Community.

2. Agile Enterprise

Objective: To enable EU industry to improve its competitiveness and to respond to consumer demand by improving productivity, flexibility and supply chain response and through reduced product lead times.

Contents: The theme includes business process re-engineering and the development of the virtual enterprise, manufacturing management and control, reduced product lead times and increased product flexibility, based primarily around information and communications technology, computer integrated manufacturing and new production/design technologies and human and organisational effectiveness.

Rationale: Increasing globalisation of manufacturing and manufacturing support services (information control, design, etc.) combined with increasing competition (especially in the Far East where labour costs are less than half those in Europe) and shorter product life cycles has led to significant downsizing and contracting out in manufacturing, whilst consumers require quickly altering product types and mixes. This requires a more flexible faster response in the design, manufacturing and distribution chain, whilst coping with the massively increasing amounts of information relevant to modern product design, manufacture and marketing/sale.

3. More Efficient and Sustainable Processing Industry

Objective: To help EU industry to meet the demand for cheaper higher quality products, produced with minimum demands on the environment.

Contents: This will include all aspects of materials processing and process control, energy use in production, product recycling and life cycle aspects, as well as raw materials use and consideration of environmental impact. Processing in this sense is taken to include all physical and chemical material transformations. The major S&T areas are energy technology, chemical technology and materials/engineering technology, with some developments in information technology (particularly standards).

Rationale: Manufacturing industry represents 22 per cent of the EU GDP, employs 32.4 million (23 per cent of the EU workforce) and consumes the equivalent of 226 million tonnes of oil as energy each year, whilst placing significant strains on the environment, in terms of pollution streams. Increasing competition and consumer demand has led to a quickening pace of new product introduction, with shorter product life cycles and rapid innovation in product features/function, placing demands on materials (stronger/tougher/cheaper) and their processing. Manufacturing industry has to respond to these trends and pressures by increasing productivity and reducing scrap rates; by manufacturing higher quality products from lower quality (recycled) materials; by reducing its energy usage; and by shortening product introduction times.

4. Energy for Tomorrow's Europe

Objective: To ensure an economic, efficient and safe energy supply for Europe, to contribute to Europe's commitments under International Treaties on the Environment and to increase the competitivity of European energy industries in world markets.

Contents: Exploration, production and transport of oil and gas; power generation; safety of nuclear plants; radioactive waste management; optimising the nuclear fuel cycle; combustion and gasification; renewables, especially photovoltaics and biomass; improved and alternative transport fuels; IC and diesel engines; technologies for efficient use of energy in buildings, industry and transport; advanced batteries,fuel cells and energy storage; transmission and distribution of electricity, including superconductors; socio-economic research (non-technical barriers, modelling energy economies etc.)

Rationale: Europe must be assured of competitively priced, safe and environmentally acceptable energy sources if its economy is to grow and the quality of life of its citizens is to be improved, but the EU imports nearly half its energy requirements (largely from politically less stable regions). Energy supply and use has a major environmental impact (about 80 per cent. of CO_2 emissions and substantial SO_x and NO_x pollution). The safety of nuclear plants must be assured and nuclear waste properly managed. European energy industries (eg. oil and gas production technologies, power generation) face fierce US and Japanese competition, especially in emerging markets in China, India and the FSU states. Continued RTD effort is needed to develop clean and efficient energy technologies for both Europe and world markets.

5. Better Construction

Objective: Improve value for customers of construction (30 per cent better value for money in five years) and to improve productivity (20 per cent in three years) in the construction process.

Contents: Construction-related technologies—flexible design methods, re-engineering of facades, designs to re-use buildings, durable materials and systems for easy maintenance, new materials, benchmarking of performance, lifetimes and costs, demonstrations of new building forms, techniques for predicting service lifetimes, information technology to aid visualisation of designs, client-centred construction.

Rationale: Mismatches between the promise and performance of buildings and civil engineering works, especially regarding their durability and value, have negative effects on customers, the construction sector and national economies. Efficient infrastructure contributes to national economic performance and harmonised development. Research is needed on life cycle costing and environmental issues in construction. Innovative technologies can improve value for customers of construction and offer significant productivity gains for a major industry sector (10 per cent GDP in most member states). The theme will build on the development of harmonised European technical standards from the EC Construction Products Directive and Eurocodes for construction design within the Single European Market. The end users will include construction companies, private and public sector clients, professional institutions and trade associations. The theme links with some aspects of the Industrial and Materials Technology Programme of FP4.

6. European Aeronautics for World Markets

Objective: Enhance competitiveness of European aeronautics industry through maintaining technological base of European aeronautics firms on an increasingly collaborative basis.

Contents: Technologies for safe and efficient aircraft (including air traffic management), technologies for reduced production and operating cost of aircraft, technologies for reduced environmental impact of air transport. Support for advances in product and supply performance that will help to bring about effective collaboration between firms, efficient supply networks and programmes that research and demonstrate European capabilities to customers in Europe and around the world.

Rationale: The aeronautics industry is of crucial importance in Europe and must be competitive in the future world market. Progress can only be achieved through co-operation, not by any single factor in any single nation. Of the many factors, research and technology on a European scale, properly managed and funded and properly directed stands out as a key element to support advances in product and supply performance. No one programme will deliver these benefits, they will only be achieved by an integrated set of measures. The activity at a European level adds value to that at the national level in the main aeronautics countries, including the UK.

7. Tomorrow's Car

Objective: To enable the European automotive industry to produce vehicle component systems that are significantly more environmentally friendly, yet meet global market expectations for safety, performance and cost.

Contents: Materials and structures and related processes for stronger, lighter vehicles; engines, fuels and exhaust treatments, electric and hybrid vehicles and component systems and advanced electronics component systems, for greater economy and reduced pollution, especially in urban/sensitive areas; vehicle design methods, processes and organisational aspects for reduced costs and lead times; telematics systems for increased economy and reduced congestion.

Rationale: Mobility is essential to economic activity and the automotive industry itself is a major wealth creator. Vehicle production contributes 2 per cent to the European GDP; employs 1·8m (8·3 per cent of all manufacturing jobs). Environmental pollution, the risk of irreversible global climatic changes, traffic accidents and congestion are global problems requiring a global response. If European automotive manufacturers fail to collaborate to produce technological solutions to these challenges then they will enjoy a shrinking share of future global markets.

8. THE INFORMED CITIZEN

Objective: To empower the citizen to take an active part in the Information Society, by individual self-development from easier, efficient access to information from public and private sector organisations.

Includes: Demonstrating, and encouraging the use of information systems. Presentation of data in user-friendly forms, the man/machine interface, novel forms of input and output, multi-language systems. Usability, privacy and security. Innovative means of information distribution and exchange throughout Europe, including the use of satellites for mobile communications. Access and applications for urban and rural areas. Applications for libraries, culture, education, distance learning and leisure.

Rationale: To make the best use of the growing mass of information in the "Information Society", the individual must be able to access and assimilate this readily, to allow all members of European society to develop their potential, and quality of life. This will enrich Europe as a whole and offer coherent progress for all its citizens to form a community which can hold its place globally. This theme includes aspects of the current IT, Telematics and ACTS Programmes and of Space Technology in the Environment and Climate Programme. This FP5 theme complements "Intelligent Business and Administration".

9. MOLECULAR AND BIO-TECHNOLGIES FOR COMPETITIVENESS AND QUALITY OF LIFE: INNOVATIVE PRODUCTS, PROCESSES AND TREATMENTS

Objective: To enhance and demonstrate the capability of European bioindustries, their supplers and users. To promote innovation which will lead to increased competitivity and employment opportunities.

Contents: "Cell Factories", bioprocessing and biocatalysis, pharmaceutical development, bioremediation, technologies for health, agriculture, fish and forestry improvement (includes gene therapy, human, animal and plant biotechnology, immunology and vaccinology), quality and novel uses of agriculture, fish and forestry raw materials (including by-products) in food and non-food processing, food safety. Underpinning technologies in genome and gene function research, molecular physiology, structural biology and bioinformatics.

Rationale: Biotechnology is likely to be (with IC&T) the dominant technological source of economic advantage in the next century. Concentrated European action is needed to enhance current capability, building on strengths in the chemicals, pharmaceutical and agro-industries and the biosciences. Biotechnologies will underpin the manufacturing economy and improvements in the quality of life. High-tech SMEs are a characteristic of this sector. Users already identified are the chemicals, bioprocessing, pharamaceutical, agriculture, food, fish, forestry, healthcare and other biotechnological-related industries and their suppliers, plus Government Departments.

10. SUSTAINABLE FARMING AND FISHING

Objective: To underpin European policies and regulations related to agriculture, fisheries, food, forestry and rural development, including the CAP and CFP.

Contents: The theme would include viable, diversified environmentally friendly farming systems; food safety, plant and animal health and animal welfare; protection, development and exploitation of European forests; aquaculture and protection of natural fish stocks; rural and coastal communities dependent on natural resources and the impact of EU policies on them. The programme would bring a range of disciplines and technologies to bear, including applications of IT, engineering and earth observation technologies.

Rationale: The CAP and CFP are expensive policies, supported by extensive legislation, which affect all member states. EU policy is now aimed at developing systems capable of satisfying consumer demand for high quality, reasonably priced goods produced where possible within the EU, while at the same time meeting environmental and human and animal health objectives and regulations. Member states have many comparable problems and many run major national R&D programmes which would benefit from close coordination and unified development. The main users of the RTD would be the EU Commission, member states' governments and enforcement agencies, Research Councils and farmers, fishermen, foresters, consumers, and rural and coastal communites.

11. SUSTAINABLE TRANSPORT

Objective: To develop innovative solutions to managing the unabated increase in the demand for travel whilst protecting economic growth and quality of life.

Contents: Development of a European transport system utilising all transport modes—so that passenger and freight travel is undertaken in the most cost effective and environmentally friendly way. To identify policy and operational options compatible with system efficiency which are safe, reliable, reduce congestion, protect the environment, and allow choice. Research to address competition, modal choice, interoperability, accessibility, mobility, capacity and demand management, traveller and operator services and telematics applications.

Rationale: Transport affects us all through the delivery of goods and services, travel for business and leisure, and its safety and environmental impact. People travel on average an hour a day and 200 kms a week. UK transport operations account for 16 per cent of household expenditure, up to 10 per cent of GDP, and the employment of 2 million people. Demand for travel continues (70 per cent growth in Europe since 1970) and imposes ever greater strains on society, the economy and environment. Demand has outstripped willingness and ability to pay for new infrastructure. The dominance of roads has led to unacceptable health costs (annually 50,000 killed in Europe and a quarter of a million injuries in the UK). And the environmental implications are inconsistent with sustainability (2 per cent of European GDP lost on congestion, second largest user of non-renewable energy, and 25 per cent contributor of all CO^2 emissions).

12. SUPPORTING EU ENVIRONMENTAL POLICY

Objective: To support the implementation of the European Community Programme of Policy and Action in Relation to the Environment and Sustainable development (AP5).

Contents: RTD under this theme will relate to the four issues and seven environmental themes of AP5, as follows: improving the factual basis for the formulation of Community environmental policy; sustainable production and consumption patterns; shared responsibility and partnership; promotion of local and regional initiatives; climate change and ozone depletion; acidification and air quality; water resources management; waste management; noise; nature protection and biodiversity; accidents/risk management.

Rationale: AP5 will become the foremost EU policy framework on environmental issues when a Decision, expected by the end of the year, on the AP5 review is taken by Council and Parliament. Definition of the areas of RTD needed to progress both the development of the action programme and to ensure effective implementation of these objectives would be developed by DGXI in conjunction with member states. Drawing together the RTD required under a single theme within a Framework programme will be the most effective way to deliver the necessary outputs.

13. STRENGTHENING THE SINGLE MARKET—MEASUREMENTS AND TESTING

Objective: Establish a capability for testing and certifying quality European products across all sectors via measurements and tests which demonstrate compliance with EU Directives and supports the Single Market.

Contents: Collaboration in testing and certifying the performance and quality of European products in accordance with Community Policy; RTD to ensure that European standards and testing laboratories produce and provide consistent measurements and tests that are equivalent to those made by Europe's major trading partners; RTD to underpin the availability of technical tests to demonstrate compliance with EU directives.

Rationale: Beneficiaries are industries in all sectors which use measuring and testing services to demonstrate the quality of their products and compliance with standards, as well as standards makers in environment, health and safety fields where consistent measurement is required. Without EU support for work in this area industries will not be able to implement Community Policy in an effective manner and will be increasingly be uncompetitive and lag behind the progress being made in other economic and trade groupings.

Examination of Witnesses

MR R D J WRIGHT, Director, MRS KATE ALLAN and MR DAVID MOORE, International S&T Directorate, Office of Science and Technology, Department of Trade and Industry, called in and examined.

Chairman

1. Welcome, Mr Wright. I do not know whether you would like first of all to introduce your colleagues?

(*Mr Wright*) If I may, thank you, my Lord Chairman. I am supported here by Mrs Kate Allan, who works for me on policy issues and especially on the training and mobility of researchers programme part of the 4th Framework Programme, and Mr David Moore, who supports me on the industrial aspects of the programme and particularly on the dissemination and exploitation programme.

2. You understand that this is our first meeting and it is appropriate therefore that we have the benefit of your advice at this early stage. Would you like to say a few words of introduction before we ask some questions?

(*Mr Wright*) If I may, my Lord Chairman. I have little to add to the evidence we have submitted to the Sub-Committee, which comes together with the UK Position Paper on the 5th Framework Programme attached to it as Appendix A. The government very much welcomes the sub-committee's interest in this area, which is both important and timely, given that we are currently preparing for the 5th Framework Programme. I wonder if it might be helpful if I were to say something by way of introduction about the timetable for the completion of the negotiations on FP5 and about the key principles to which the government attaches particular importance in these negotiations. As regards timetable, we have had the Commission's "principles" document in July 1996, which I believe the sub-committee has seen. We are expecting now the Commission interim working paper in December, which should be available before the Research Council of Ministers which is to be held on 5 December this year. We would then expect to see a proposal from the Commission on the 5th Framework in the spring of 1997, which would lead to a decision in Council towards the autumn of 1997. The Framework decision after conciliation will therefore come about either at the end of 1997 or possibly at the beginning of 1998. The date is significant for the UK in that the beginning of 1998 is our Presidency, so that decision would fall within our Presidency. At the same time the specific programmes will have to be brought forward with an aim to produce specific programme decisions by the end of 1998. All of this will be negotiated against the background of a set of financial perspectives which are not yet settled for 1999 and beyond. All the present assumptions about the 5th Framework Programme are based therefore on, at best, nil growth in the Framework Programme in Europe, and possibly some decline. There is a very tight timescale against which we are working on these negotiations. If I might turn to the UK Position Paper, this lays particular emphasis on the next Framework Programme being focused on high quality, objective-driven, applied and strategic R&D, which derives from the needs of customers or users, adds value and respects subsidiarity. That is good Euro-speak and perhaps I might say a few words about the content of that. First, users. We take the view that there is much to be gained by building explicit customer-contractor links into all aspects of the framework. The technology foresight exercise in the UK has taught us a great deal about the value of involving users of applied strategic research in helping to set industrial and broader priorities. We want to carry those principles forward into the 5th Framework. Equally, on the policy front we believe there are strong grounds for better articulating priorities between the relevant policy Directorates-General in the Commission and the research effort. We have suggested that we can build on the experience of the task forces that were created in the 4th Framework Programme to achieve this, but we strongly believe that if we are going to take that approach it has to be built in from the outset of the Programme. We have seen in FP4 the problems of trying to spatchcock the task forces onto a framework that is organised in a different way. Secondly, perhaps I might say something about objective-driven. We believe it is essential that we know from the outset what we are trying to achieve through the framework programme. Obviously it has to contribute to the principles in the Treaty, enhancing the competitiveness in support of European industry and supporting European policies. But we believe it has to be grounded more firmly than that for two reasons: first because it will help us to evaluate the framework programme and the results of it; second, because it will enable us to demonstrate the relevance and raise the visibility of the programme as a whole. To that extent, on this question of relevance, we support at least part of what the Commission appears to be driving at in its own paper when it talks of bringing the framework programme nearer to citizens. That is an important element. Thirdly, on focus we believe that the programmes have to be concentrated on things which matter most for Europe. It is important to avoid the temptation to load the programme down with everybody's pet subjects. It is very much in the hands of the Commission to come forward with a proposal that does that and we hope that they will do so towards the beginning of next year. It is equally important that we work with other member states to make clear that this does not necessarily mean fewer, bigger projects. Rather it means fewer, more important objectives. That is the message we have to work to get across, particularly to the smaller member states. Quality is another key word in our principles. We believe this is an essential element in securing value for money. It is not the place of the framework programme to fund second-rate research under any circumstances. We talk too about added value. It is not just a question of doing things at European level because the money is there. The programme must look to do the things which will benefit most from intervention at a European level, that is, the things which can only usefully be done at that level because of questions of scale, because of bringing together a wider range of expertise to enable the development of centres of excellence and so on. Finally, subsidiarity is another key principle, which

Chairman *contd.*]

is important and separate from the added value principle. Article 3b of the Treaty requires that the Community does only the things which cannot be done by member states. So even if the programme can add value at a European level there is still no case to intervene unless to do so would be to achieve something which could not be achieved by member states acting individually or collectively outside the Community. Those are the principles that underline the UK position on FP5 and we have proposed in the paper a mechanism which is designed to give effect to those principles. My Lord Chairman, we welcome the Committee's questions on this, which we will do our best to answer.

3. Thank you very much. You have raised an awful lot of issues there which we shall certainly follow up. You clearly feel there is a role for a European research programme. Why do you feel that? Is it the case that there are some projects which can only be delivered in this way?

(*Mr Wright*) We believe so. We believe that the framework programmes give rise to two main forms of benefit: first for Europe and second for the UK. As regards Europe, the programme offers an opportunity in particular to bring to bear on trans-national problems the very best intellectual analysis across national borders, and also to raise the average of European industrial performance in the medium term. Those are the broad European objectives. For the UK there is a range of benefits. First, the framework programmes allow the UK to participate in technological breakthroughs which will lead to new products on the market and to the development of new tools, methods and procedures which can enhance manufacturing processes. Second, the programmes create access to new markets for both industrial and non-industrial participants. Firms linking up with other firms and with universities across Europe are getting access to new markets that way. Equally, universities here in the UK working with foreign firms are identifying new areas where they can embark on research, new people they can work with, new ideas and so on. Thirdly, the frameworks reduce the potential risk of UK participation in research, for example in proof of concept projects. Fourth, the frameworks permit capability development, particularly for smaller firms. Small firms beginning to participate in the programme can find opportunities to link up and make new connections which will enable them to embark on research and development, to develop their own capability for themselves. Finally, the frameworks allow the development of supplier chain interactions which can lead to much better understanding by companies of their users' needs. One very large company in the UK has told us that one of the big things from their point of view is that they are able to talk to their customers' customers' customers and they have brought them together in the research context to identify what needs to be done and to put in place the research needed to do it. Most of these benefits occur directly to the participants in the programme. They extend far beyond the limits of the actual research undertaken. For many participants money is not the main incentive. It is these other factors that contribute the most in terms of benefits. The 1993 UK impact study which was carried out by PREST showed a very positive impact on all sectors involved in the programme, which was then the third framework programme, FP3. It also demonstrated that the benefits were genuinely additional, either absolutely or in terms of the volume, speed or the orientation of the relevant research. Taken together, we believe that these benefits fully justify the UK's continuing participation in the programme.

4. We are now in the middle of the 4th Framework Programme. You have had to assess each of these programmes. There are other ways presumably of achieving a European framework programme on projects on a European basis. EUREKA is an example where you have something which is rather less bureaucratic, rather more streamlined. It is an enabler to bring people together. You have presumably been able to assess which adds most value to the process of the very rigid bureaucratic procedure (which everyone agrees needs streamlining) of the framework programme, or something rather different. How have you been able to assess this framework programme as something which is going to be desirable to continue? What have the results been in the past?

(*Mr Wright*) The framework programme needs to be assessed on its own merits. One very important distinction between EUREKA and the framework programme is that EUREKA is very much nearer to the market, very much more in the product development area for the most part. The collaborations come together because there is a fairly direct commercial benefit to result from it. The framework programmes are positioned in a rather different place in the spectrum. They are designed to work further away from the market. The money that is made available through Europe can encourage rather higher risk research where there is not the same certainty of outcomes, or at a rather earlier level where the results of the research can have a wider impact on European competitiveness or policy in general. In that sense they are trying to do rather different things. As regards evaluation, it is difficult in so far as evaluation is inevitably a fairly long term process, and we have to move on to look at the next framework programme before we have fully evaluated the one we are currently in. However, the evaluations that have been done of FP3, which are complete, and the monitoring and evaluation activities that are currently going in FP4, suggest that there is clear added value. Real results are being achieved which would not come about if it was left merely to member states to try to pull together the various parties across Europe to do this research further from the market. That is the big distinction.

Lord Gregson

5. Arising out of the Euro-speak that you started explaining you said that the two main issues that were supported by these programmes were trans-national technologies that could not be done in any other way, technological breakthroughs. Can you give us an example of an outstanding trans-national issue that has been researched by the programme and

Lord Gregson *contd.*]

reached the headlines? Also, can you give us an example of a technological breakthrough of any importance that would merit the spending of getting on for 15 billion in European money? It is an enormous amount of expenditure that is being poured out on this lot. I do not remember seeing a headline.

(*Mr Wright*) In terms of the first one, trans-national achievements, one can quote for example in the biotechnology area some of the work that has been done upon gene sequencing on the model plant arabidopsis, and on baker's yeast, which is I think the first time that a genome sequence has been completed on such an important species. That is a classic example of working across national boundaries to achieve something which would not be achieved otherwise.

6. It is not a trans-national issue of any importance, is it?

(*Mr Wright*) It is a trans-national issue. It is a global issue to try and learn from these opportunities. It is the sort of thing that cannot be dealt with except trans-nationally. I think that is an important aspect.

7. But that is a world programme. It is not a European programme, is it?

(*Mr Wright*) Yes, there is a world programme as well on genome mapping, but I think it is recognised that in terms of genome mapping one is not going to get very far working in isolated groups. It is very important to bring together teams from different countries, either globally or in Europe.

8. On a world basis?

(*Mr Wright*) On a world basis, but in Europe as well because there are in fact commercial opportunities that will result from this work so that it is worth Europe itself keeping up with it.

9. What is a great technological breakthrough which these billions of ecus have produced?

(*Mr Wright*) I would not point to any one particular technological breakthrough. There is a range of success stories which have been produced and have been published. There is a booklet published by the IT programme on the major achievements of the IT programme, and there tend to be very many of them. There are a lot of significant breakthroughs in that area for example. There are other examples from almost all of the other aspects of the programme in the other areas.

10. You would not describe those as technological breakthroughs, would you? Most of them are a bit trivial, are they not?

(*Mr Wright*) Certainly the participants in the programme believe that there is some technological value in it in that they keep coming back for more.

Lord Gregson] They are getting paid. It is cash for nothing, is it not?

Lord Phillips of Ellesmere

11. Could we go back to your definitions of the sort of research that you would like to see the framework programme supporting? Can I begin by saying that I was a little disappointed to find in your discussion from paragraph 29 onwards in your paper what seemed to me to be a view of research and development which was underpinned by the linear model, that things necessarily begin with basic research and go on to apply the research through to development and then production and so on. That I thought was a model which was now thoroughly discredited and I hoped it was not a part of your thinking. But then you go on in your paper, and I thought to begin with it must have been a mistake, and tell us that you think the programme should not deal with near market research. "Near-market" was a term introduced unfortunately in discussions in this country in about 1987 but which has never figured in Frascati and is not understood anywhere else, I should have thought. The white paper of 1993, in paragraphs 2.20 and onwards, I thought effectively put it on one side even in UK consideration. That is not reflected in your paper at all. Then you go on to talk about applied strategic research. We have a lot of difficulty with Frascati because Frascati does not recognise strategic research either. We have had to take trouble defining that. You have now invented something called applied strategic research which does not figure in Frascati and which nobody in Europe would understand and which I do not understand. As I say, I thought it was a mistake. It figures in the summary of your position paper but then when we get to the part that you have quoted it turns into objective-driven applied and strategic research. In your verbal introduction you were back with applied strategic again. Just what is the sort of research that you want to see the European programme focusing on?

(*Mr Wright*) I accept that there may be some confusion in this area.

12. Is that intentional confusion?

(*Mr Wright*) No, it is not intentional confusion. The Frascati definitions clearly provide us with useful reference points on what one might describe as being a linear process, but in fact one recognises that all these areas blur into one another and there is no linear process moving from one end to the other in terms of research. The message we are trying to get across in the case of the Commission is that we expect the framework programme to cover a broad range of areas of research, but we are delineating, we hope, the ends of that range. At the one end we are saying that the framework programme should not be used to support basic research per se but it should be used to support basic research which is deemed to be necessary by the users of research to enable them to bring on the technologies for the future. At the other end of the scale we are saying that the programme should not be involved in product development. It should not be involved, in the Frascati terms, in experimental development where essentially the benefits accrue to the particular users of that research directly. In this broad area in the middle between basic and product development we are trying to position the framework programme. I accept fully that it is very confusing. The Frascati defintions were invented initially to try and help. In some ways they have and in some ways they do not provide us with the full answer. We are trying to establish that answer as far as we can descriptively in the paper.

Lord Phillips of Ellesmere *contd.*]

13. Do you not think you are confusing the issue even further by introducing terms like "applied strategic research" and so on?

(*Mr Wright*) It is certainly not our intention to confuse things further. In the summary we were trying to condense everything down. In the paper we have gone to some lengths to try to explain what it is that we mean, given that we recognise that the meanings are obscure to say the least.

14. Can I draw your attention to the footnote on page 3—it is page 1 of the full document—of the position paper. It is not clear what that footnote is defining.

(*Mr Wright*) The intention there is to define "applied and strategic research and technological development".[1]

Lord Phillips of Ellesmere] I repeat: it is not clear that that is what you are trying to define.

Chairman] Perhaps you can note our confusion.

Lord Porter of Luddenham

15. Following the same line, Mr Wright, you would agree that collaboration is good in research, whether it is done at a national, European or global level? In fact it is done at all of them for most subjects. What we are talking about is your plea that there is a continuing need for a European programme of research. I wonder how you decide what is European really. Let me ask you one specific question on your evidence at paragraph 31 where you have made this decision. You say "... the framework programme should not serve as a funding source for pure basic research as such. This should be the responsibility of member States." If you put that the other way round it would be equally convincing to me. Why is pure basic research not suitable for member states?

(*Mr Wright*) I think it essentially comes back to what we are trying to achieve through the programme. What we are trying to achieve, and this is written into the Treaty, is to make a fairly direct link to European competitiveness and therefore that gives you first the figures on Europe and on the member states of the Community. Second, it gives you a focus fairly clearly on research that will come through to affect competitiveness in due course.

16. European competitiveness is the thing you talked about a number of times. We also have national competitiveness, and we have global competitiveness. In research what is the difference here? Why Europe? Why does Europe have to compete in its research with Japan, say, but the UK not compete with Japan? In basic research particularly, which you are excluding, I should have thought European competition and collaboration was part of the whole science story, global and national included.

(*Mr Wright*) That is absolutely right, but essentially we are looking at what we can best spend European money on. At the basic level the conclusion is that this is best covered by national governments because there is no direct relationship between the basic research undertaken and the competitiveness of Europe, which is competitiveness as you mentioned as against Japan and the States and other major trading blocks. It is a decision that, if one is going to have a research programme, if one deems a research programme to be good value for money in the sense that we do, it is positioned here in the middle of the basic to product development spectrum where it will have the most impact broadly across Europe. That is not to say that there should not be collaboration across Europe in basic research. There is a great deal of collaboration.

17. Can I press you a little further on that? Can you give examples of research not in the pure basic area or any research which is specifically of advantage to Europe and to nobody else?

(*Mr Wright*) No, I cannot give an example. If there was research that was of advantage to Europe uniquely one would wonder why we were investing in it at all because presumably we would be in some sense ahead of the market.

18. Not exclusively, but particularly applicable to Europe, research which is particularly applicable to, suitable for and needs to be done in, Europe rather than elsewhere?

(*Mr Wright*) If one looks at, for example, many of the areas currently covered by the 4th Framework Programme, there are European industries emerging in biotechnology, in IT, in telematics, where there are industries that have themselves, because of the links they are building across Europe, become European. I do not know if Mr Moore would like to add something to that.

(*Mr Moore*) One could refer to the IT programme and, looking back over the 2nd and 3rd Framework Programmes, identify that through the IT collaboration in Europe arguably the European software industry has been able to remain in the competitive race with the United States and Japan where, without collaboration on a European scale, it is very likely that the individual member states' software industries would simply have been overwhelmed by such competition.

Lord Gregson

19. Half the software created for UK programmes is generated in India.

(*Mr Moore*) I do not think that alters the fact that at the level of the type of research that my colleague was describing, having to follow through from the strategic stage and through exploitation plans in the proposals which, through UK insistence largely, have to be in the project proposals now. There has been a clear European added value. That is

---

[1] "The footnote to paragraph 2 (ii) the UK Position Paper is intended to define the phrase 'applied and strategic research and technological development'. The definition is consistent with the definitions used in the 1996 Forward Look of Government-funded science, engineering and technology (paragraphs 1.1 to 1.10 of Cm 3257-II), which draws on the definitions in the 1993 OECD Frascati Manual. *Applied research* is defined as 'original investigation undertaken in order to acquire new knowledge ... directed primarily towards a specific practical aim or objective'; and *strategic research* is used to describe 'work ... where practical applications are likely and feasible but cannot yet be specified, or where the accumulation of underlying technological know-how will serve many diverse purposes'."

Lord Gregson *contd.*]

complemented in many ways by, through market forces, collaboration with other countries including India.

Lord Lewis of Newnham

20. May we turn to the actual Framework 5 Programme that is being projected by the Commission themselves. You made a very clear point on the assessment of the previous programmes. One presumes from that lessons were learned that will be transposed into the next framework programme; yet it would appear to me that, looking at this particular group of topics that are now being chosen, there is a significant change in direction more to the social objectives within societies rather than perhaps some of the other programmes that we have been involved in. There are two points I would like to ask you. One is how far you agree with this particular change in direction and, if you do, what you attribute it to from the point of view of previous experience and assessments of the programmes, and how you see the continuity of programmes that have been started previously which in other programmes have been continued in certain ways into the next round?

(*Mr Wright*) One needs to look at the Commission paper in the sense in which it was drafted—as a statement of principles. We regard it as being a very skilfully drafted document which at one level was designed not to upset anybody and it is very difficult to pin down what the Commission is intending to bring forward from these principles into their proposals for the next framework programme. Certainly one can read into it I think a degree of shifting from competitiveness towards social objectives. That certainly comes out through some of the statements. On the other hand, if one analyses in depth the individual priorities that are described one finds a list of areas very similar to FP4. We would not want to see a shifting in the 5th Framework Programme away from research aimed at developing technology. That we see as the primary purpose of the 5th Framework as we have made clear in our position paper. At the same time there is a need to continue to produce the research that will support development of European policy in other parts of the Commission. We would expect the balance—which at the moment is something like just over 60 per cent on the industrial end with some 25 per cent on the social end—to be maintained roughly in the 5th Framework Programme. Of course in another sense it is not the case that the social and industrial objectives are distinct at all because certainly the concern over sustainable development is creating new industries, new environmentally friendly technologies, and the application of telematics to social needs, for example for the disabled, for the elderly, is also opening up new markets. There is a blurring in the middle of that distinction as well but overall we would expect the balance to be roughly much the same. We are not entirely clear that the Commission was intending the balance to be read differently, but I certainly accept that it could be read that way.

21. Do you anticipate that the directives involved in the EU would be different?

(*Mr Wright*) We would expect that by getting a much closer link between the policy directorates and the research effort in the social end as we have described, that yes, directives, the development of policy in Europe, would be better informed. That has always been seen to be an important part of the framework programme. We would expect it to continue to be an important part, but we would not want to see a shift in that direction in terms of the overall balance of the programme.

Baroness Platt of Writtle

22. You mentioned at the beginning of your introduction that you wanted to see the programme more tightly focused. In our evidence from the EPSRC they say very firmly that that is something they would welcome because much effort is expended because almost anything could go in and that means wasted effort. I am not absolutely certain but in Annex C in the paperwork we have had in your examples thematic objectives for FP5, and that does seem to me to be all things to all men. I read that under sustainable farming and fishing the theme would include biodiversified environmentally friendly farming systems and then goes on, it seemed to me, to include anything, I wonder do we need to focus it more tightly?

(*Mr Wright*) That is a very fair question. It is a very difficult thing to do to try to focus the framework programme. What we are trying to do is to describe in this paper the sort of areas of research that we think are going to make the biggest contribution to Europe in the longer term. Within the programme as a whole we are trying to identify clear areas where research is needed and where research is going to add value. There are a number of those areas and we would not want artificially to constrain that beyond a reasonable level. What we want to have is a very clear statement of what the framework is intended to address. Beyond that there is another point that comes from that question. Individual calls for proposals must be very clearly specified as to what it is they are driving at because at the moment the success rate of the proposals is very low with the implication that a lot of people are investing a lot of effort and a lot of money in developing proposals which are going to go nowhere. We have made clear to the Commission and more generally that we think it is absolutely crucial that the calls for proposals are crystal clear and very tightly drawn in order not to waste that money. So my answer essentially is on two levels. First, we want to constrain the programme and not allow too many baubles to be hung on it like a Christmas tree, and then, within the programmes that are determined, to try to get the calls for proposals as clear as possible.

23. That does not become immediately obvious from Annex C. We had a Select Committee a year or so ago on biotechnology and global competitiveness and I know at that time we were very concerned that Europe should not be too bureaucratic and regulatory. I was concerned at the end of Annex C where it says at number 13 that some of the research should be to improve wealth creation, but then it talks about the importance of industries being able to

Baroness Platt of Writtle *contd.*]

comply with regulations. It seems to me that on that one wants to be clear, but over-bureaucracy is not leading to wealth creation.

(*Mr Wright*) Absolutely. We would not dissent from that for one moment. Item 13 in the list of examples that we have presented to the Commission is particularly about standards in the measurements and testing area. It is about enabling firms to comply with the requirements they need to comply with, for example on weighing things, on measuring things and so on. There was no intention certainly in this to suggest that there should be greater regulation in any field, but merely to try to get better regulations where you have got to have regulations and to base them on good research.

Lord Phillips of Ellesmere

24. Coming back to your reply to Lord Lewis in which you said that you did not really anticipate or wish for a shift towards social sciences, would you not nevertheless agree that many of the programmes have social science implications within them which need to be addressed? You have for example already, if I may say, boasted about the European contribution to the yeast genome project. Genetic engineering is a matter of promise to some people and a matter of threat to others. There is a big social science job to be done really in relation to social concerns about that kind of thing. The same applies to energy for tomorrow's Europe. The technology for the fast breeder reactor is available but is it acceptable and so on. Do you not think the framework programme should actually move a little towards addressing the social science issues involved in these programmes?

(*Mr Wright*) Perhaps I could make my earlier answer to Lord Lewis clear. I was talking there not about the social sciences so much as about social research—in terms of environment, transport, rather than the IT programmes and other industrial programmes. To answer Lord Phillips' question, yes, we very much agree that there is a need for the social and economic sciences to play a part in research in Europe. As part of the UK position paper we have produced a matrix which showed the relationship between disciplines if you like on the one hand and the programmes of research we are seeking to pursue on the other. One sees from that matrix that indeed the social and economic sciences under almost every heading have a contribution to make both to the industrial objectives and also to the social policy objectives of the framework programmes. I very much agree with that point.

Lord Gregson

25. You did raise in your paper the weaknesses in management in existing programmes and you particularly mentioned the question of insufficient transparency in the pre-project evaluation process. Can I add to that the lack of transparency in the post project evaluations? They started to try to do a cost/benefit analysis in the peer review panels but when they realised they had got some lousy figures they dropped it. They do not do it any more so they do not know if it is of cost/benefit to any of the participating countries. Are you pursuing this question of the poor management image of the whole programme, which has been raised by almost every member government, I might say? Is it time to look at this more seriously than before?

(*Mr Wright*) We very much agree with that comment. Indeed we are pressing the Commission on a number of fronts to try and improve the management. Mrs Allan has been directly associated with some of that and might like to answer some of the points raised.

(*Mrs Allan*) On the general management issues of efficiency and transparency in the administration process, that is in the initial selection process and the subsequent management of projects, there has been a great deal of concern expressed about the excessive length of the process and the lack of transparency in a number of aspects. I think this concern has been shared by all member states. We believe that the Commission are starting to take this seriously. They have consulted widely among research organisations and had a major seminar on the issue in Brussels on 25 June. They have produced a set of proposals to address a large number of the problems. They have set themselves targets that will be excellent (if they meet them) for increasing the speed of flow through of project applications which is a source of great frustration to applicants at the moment, and they are looking at ways of tackling their internal management processes to make them more efficient to produce a timescale that is more acceptable. We are tracking that. On the peer review process, a number of improvements appear to be in train to make it more transparent. Programmes are now publishing in advance very explicit sets of criteria that are used in the peer review evaluation process. This has been regarded as a very considerable step forward. We are seeking also to get better feedback both to the applicants and to the management committees that make the decisions, so there are some improvements in train. We are also seeking to get the process of negotiation of contract improved following the initial selection made, both to make it quicker and to try to avoid some of the, we think, unnecessary chopping and changing of projects at that stage, which again is a source of aggravation and inefficiency. Those are the changes that we would like to see and which are to some degree already in hand in the management process.

26. Since cost/benefit analysis is a fundamental plank in this government's attitude to R&D, can we not push for cost/benefit analysis to be carried out on a post project analysis?

(*Mrs Allan*) The current government's approach to the evaluation of its programmes across the board is based on what is called the ROAME approach, which is a system under which you set out a rationale of the programme, its objectives, and you agree those up front so you know clearly why you are doing the project.

27. This is pre-project, is it not?

(*Mrs Allan*) Yes, this is pre-project, and then you set up systems for monitoring programmes, so you have a data stream coming in, and then evaluating it, which means having a comprehensive look at what

Lord Gregson *contd.*]

they have achieved, whether they were trying to do the right thing in the first place, and what changes need to be made in the future. This is not wholly founded on cost/benefit in the sense of trying to compare the money you have put in with the returns you have got out. I am not an expert in this area but my understanding from the experts is that it is actually very difficult to draw up a sensible balance sheet in money terms that sets out the costs on one hand and all the benefits on the other.

Lord Gregson] That is not the opinion of your Ministers, I might say.

Lord Lewis of Newnham

28. Perhaps Mrs Allan would know this. I presume you have a lot of contacts in Brussels. My experience of other programmes has often been that the problem very often is that there is no continuity in staffing, that the staffing problem is very difficult because you have part-time staff, you have contract staff and you have permanent staff and a mixture of these involved with the possibility of transfer from one to another. My own experience in dealing with the PHARE programme has been in trying to contact people in Brussels and you end up talking to person A and a year later you try to contact person A and you are told they are no longer there and you have to talk to person B. Is there a problem in this particular area because I think this is an important feature that is often hidden by the system? Is there a difficulty which is inherent in many aspects, I have to say, of the European programme systems, of the number of staff involved in it and the continuity of staff?

(*Mrs Allan*) I do not think there is an inherently unaddressable problem. Certainly there is ad hoc evidence as you suggested of people trying to make inquiries and they do not always get the answers they want. There are failures of communication, all the sorts of things that you tend to have in any large organisation, but broadly our perception is that the Commission staff administering the programmes are well qualified and very committed to their jobs, that they administer the programmes by and large in a professional way, and that improvements are being made and have been made over the past year or so. That does not mean to say that there is still not a good way to go.

29. Do not misunderstand me. I am not doubting the determination and dedication and efficiency of people. It is the continuity that worries me. If a person is there for a year and then moved on somewhere else or is given a three-year contract on the understanding that at the end of three years there is no way they can continue in that position, which I believe is the attitude in the EU—if you have a 10-year contract, the 10-year contract terminates at that period, there is no mechanism for extending it and this is part of the selection principle for becoming a permanent member of the European Union itself—you have an underlying problem which is nothing to do with quality; it is continuity.

(*Mr Wright*) If I may answer that in the context of evaluation, which is where it was raised, all bureaucracies suffer from too rapid turnover of staff in key positions and that is something that one would certainly want to press the Commission about. In terms of evaluation, the continuity should be provided from the outset of the programme and reviewing the objectives that were to be achieved. In all of the programme we expect the actual evaluation to be contracted out because that is the only way to secure the independence that one is going to achieve from the Commission people who are actually involved in it.

Lord Lewis of Newnham] I was referring to management problems of managing the actual programmes.

Lord Soulsby of Swaffham Prior

30. I have two points and the first is about the cost/benefit analysis. It is always extremely difficult to draw up a table on this basis. Perhaps you know that the Wellcome Trust is looking at this and I hope coming up with something of particular value. My main comment is about the transparency situation. I am very encouraged to hear what Mrs Allan has said about this. How far has this gone and how far has it penetrated into the Directorates-General in Brussels? It does seem to me and I think to many people round this table that the transparency just is not there at present and it needs a lot of effort to get it to the stage that we are used to in this country. Have you asked that question? How is it going to be translated to the potential applicants for funds?

(*Mrs Allan*) I think it is taken on board as a policy priority at a high level in the Commission, and certainly Mme Cresson herself actually chaired the seminar that I referred to in June and it is certainly being followed up at Director and Director-General level in the Commission. There is no doubt about the authority in the Commission behind this. New procedures are being introduced committee by committee. I am aware myself of perhaps two or three committees where very recently very new and explicit sets of criteria for evaluation have been produced and have been made available to applicants. There is now available to applicants a kind of self-help manual in which you can check your own proposal against the evaluation criteria. Other bodies too like ESTA and IRDAC are very concerned to make sure that there is forward movement in this area. ESTA are very keen to have observers of the evaluation process and I believe the Commission are sympathetic to this.

31. Would you go so far as to identify the members of peer review panels?

(*Mrs Allan*) Clearly the Commission, to whom you are speaking later on, will be best placed to answer that. It is something certainly we would like to see. It is an area of transparency where we think there is room for improvement.

Lord Craig of Radley

32. I wonder if you could help us a bit more by concentrating on this point where the UK gets clear value for money? You said in your evidence earlier that framework programmes need to be assessed on their merits and you gave us a very helpful list of the benefits which you believe come from our

Lord Craig of Radley *contd.*]

participation in the framework programmes. When it comes to value for money in your own evidence you say that the UK derives benefits from the receipts but then go on to say in the next paragraph that it is very difficult to break down those receipts in any meaningful way. In paragraph 22 of your paper you also say that the government considers that a programme of current size and possibly smaller is one that is required and certainly not one that is leading to an increase in the overall level of expenditure. What I would like to know from all this is are we really outside the field of assertion and creative accounting? Why is government anxious to limit it? Is it a scientific judgment or is it a financial judgment that we are putting enough into the pot?

(*Mr Wright*) There are a number of things one can point to in order to show that we are getting value for money from participation in the framework programmes. Some is anecdotal. There is strong UK participation in the programmes despite the fact that participants have to commit their own money in playing a part in projects. There is considerable evidence from repeat business, if you like, that those who have participated in programmes feel they have benefited sufficiently to want to participate again, and there is a very strong commitment from all sectors in the UK for us to remain a part of what is a significant European programme as a whole. There is also hard evidence. The 1993 PREST report on the impact of the framework programmes in the UK gave a generally positive account of UK participation and showed for example that 72 per cent of academics felt they had improved their technical standing in world terms during the project they were engaged in. More than half the industrial participants had developed new products and commercial links through the programme. There is very hard evidence there that there is value for money in participating in the programmes. We also have the evaluations and reviews that have been done by the Commission of the earlier framework programmes, most of which have pointed to highly positive results. These are of course not specific to the UK but they are positive results in terms of the programmes. We are currently in the process of a series of evaluations being carried out of the existing framework programme 4 which should give us a much fuller view of the impact of this programme. Those evaluations are due to be completed around the turn of this year. They have been done in a rather rushed fashion unfortunately and we believe the Commission could have done rather better to plan for those evaluations and get them in place. We hope the quality of evaluation will not be too badly damaged by that but we look forward to seeing those results with great interest. Of course making a profit is a rather different matter. We do not actually in cash terms get back from the framework programme what we put in, but the benefits, both financial and non-financial, go beyond that as we have discussed in earlier answers. As to how we reach a judgment that the present level of expenditure is about right, that is very much a judgment. It is not a scientific judgment, it is not even a financial judgment as such. It is a judgment based on the views of those who are currently involved in the programme, those whom we consulted in the process of putting together the UK position. There is a feeling that the programme is broadly at about the right level in terms of expenditure overall.

33. Perhaps you could help us with what factors have led to that judgment. If they are not financially driven and if they are not factually driven, what is driving those judgments?

(*Mr Wright*) I think the judgments are largely driven by a scientific assessment by those who are involved in the science. There has not been a strong call from any particular sector that we have consulted in terms of putting together this position paper for a very large increase in any of the programmes. There is some suggestion of shifts within the programmes. There is some suggestion in some areas that perhaps we should spend a little less and that perhaps we are stretching the programme too far. Nuclear fission safety is one area in which we believe we are spending too much. To answer your question, our judgment overall is built up by a number of scientific judgments of other people perhaps.

34. But you said a moment ago I thought that it was not a scientific judgment.

(*Mr Wright*) Our judgment is not scientific in that I cannot quote to you specifics in one area balancing against another area, but we are reaching our view on the balance of the judgments of the scientists involved.

Lord Dixon-Smith

35. I am as sceptical as anyone else about research programmes whether they are publicly funded, whether they are at European or international or national level. There is a general point of concern which is somewhat wider than this specific issue in the sense that the proportion of GDP in Europe that is devoted to research is considerably less than the two main competitor economies, the United States and Japan, and I suppose if one says that this area is at its right level we are saying that if there is concern about this level of research, other areas should perhaps be more dynamic and doing greater volumes of work. I just wondered if that was one consideration that was in the background to this or not.

(*Mr Wright*) My Lord Chairman, I am not sure I quite caught the thrust of the question. When we talk about other areas doing more or less, I am not sure whether the question is do we do more at a national level or at a global level.

36. I am trying to get a picture of the context of this particular programme which is a European-wide programme, my Lord Chairman, if you like, in the framework of what is considered to be a European economy-wide deficit of research.

(*Mr Wright*) I think, broadly speaking, we have reached the view that the Framework Programme positioned as it is between basic and very near market, if I am allowed to use the term, is a particular area where Europe can add some value of its own. That implies no judgment of itself about the level of investment in national programmes, whether they be in basic research or in research in support of industry. It is in a sense an independent judgment which looks

Lord Dixon-Smith *contd.*]

at it at a European level rather than looking at it individually country by country. Clearly the investment of individual Member States in R&D, both in the public sector and through private sector support, varies very very widely. If one looks at the published results in the Indicators Report by the Commission one sees there are only four major investors in R&D on their own account which are Germany, France, the United Kingdom and Italy. There are a number of other Member States either not investing a very high proportion of GDP in R&D or not investing a very high amount in absolute terms. I do not think the level of the framework programme is something which influences or is influenced by the propensity of Member States to invest or not. It is something which is reached independently of looking at national investment.

Lord Gregson

37. When the original programme was being devised there were the Reisenhuber Criteria laid down and the then President of the Council was quite blatant in justifying the cost in the last paragraph of the Reisenhuber Declaration which refers to cohesion, unification and in those days (it has since been admitted) dragging up the smaller countries by their boot laces and that was the justification for the high cost of the work carried out. That does not line up very closely to your view that we are getting magnificent value for the enormous amount of money which is poured into these programmes. It has been there for an entirely different reason.

(*Mr Wright*) The Reisenhuber criteria still apply very much to research but we would question, as I think you have done, the cohesion element. The last of the criteria mentions cohesion together with research which leads, where necessary, to the establish of uniform laws and standards. I think the standard supporting activity is a perfectly legitimate activity of research. It remains a fact also, however, that all European programmes are supposed to support cohesion and that is written into the Treaty in Article 130a.

38. That costs a lot of money.

(*Mr Wright*) But the cohesion objective is, we believe, not best achieved through the R&D programme. We have said in our paper to the Commission very clearly quality should be the sole criterion on which research is funded. That may involve researchers from the less favoured countries (they do have good researchers and it would be wrong to exclude them, and their participation in the programme can have a very large spin-off for them in terms of raising their capability), but we have said very clearly we do not think cohesion should be a driving force in research.

39. Therefore collaboration should not be a criterion of doing research on this basis?

(*Mr Wright*) Collaboration should be a criterion because it should involve more than one Member State.

40. That is cohesion.

(*Mr Wright*) Cohesion is normally read in terms of involving the less favoured regions and there are separate programmes for that, for example, through the structural funds.

Lord Gregson] That was withdrawn right at the early days from the Reisenhuber criteria.

Chairman

41. For the sake of clarification can I be clear that your interpretation of cohesion does involve bringing in some of the less favoured nations in scientific terms.

(*Mr Wright*) Yes, it does but we are saying we do not believe that should be an objective of the programme as such, even though the programme should remain open to the less favoured regions.

Lord Soulsby of Swaffham Prior

42. With respect to cohesion, do you agree that enhancing the scientific capacity of less advanced European nations should be addressed via a separate explicit programme from the Framework Programme?

(*Mr Wright*) Certainly there are a number of other programmes that do address those particular issues, in particular, the structural funds. The structural funds can be used and are used to support infrastructural development in the field of R&D and more broadly in the field of technology and something like two to three per cent of the structural funds from 1989 to 1993 were used for those purposes. That is the right way, we think, to help bring up the technological scientific capability of the less favoured regions and it should not be a primary purpose at all of the Framework Programme to supplement that by supporting less than the best possible research. If those less favoured regions' scientists can participate in good high quality research then they should be involved.

43. I am sure, if I may go on, my Lord Chairman, it is not a question of all or nothing in anyone's minds, but with some of the Member States of Europe, Eastern Europe in particular, there is a tremendous amount of talent there that needs to be liberated and I would think that is an important part (but not a major part) of the Framework Programme. One must take note of that issue and provide, for example, scholarships for collaborative works where these people can come and come up to western standards through this sort of programme. It is to the benefit of Europe as a whole.

(*Mr Wright*) Absolutely and I think the question contains its own answer in that Lord Soulsby used the word "talent". We are talking about high quality research and where we can—and it is possible to—engage the best quality scientists wherever they are in Europe, indeed in Central and Eastern Europe, we should be doing that. But there is a risk in some senses of using cohesion as an excuse for supporting less than good research as a means of supporting the less favoured regions. We do not agree with that.

Lord Lewis of Newnham] My Lord Chairman, I must agree with Mr Wright. Having made proposals to the Commission there is no doubt whatsoever about it that it was an accepted protocol that if there were certain countries on the proposal it enhanced

Lord Soulsby of Swaffham Prior *contd.*]

the possibility of getting it. I am sure you are speaking from your experience and I would completely agree with what you are saying. This is a prime area of quality research.

Lord Phillips of Ellesmere

44. I have a question about your evidence in which you say that you are pressing the Commission to provide information about the programme funding going to Member States. That relates a little to what we have just been talking about. Is there not a danger here of encouraging Member States to believe there is a *juste retour* for their contribution?

(*Mr Wright*) My Lord Chairman, that is very much the argument the Commission have used in resisting our attempts to get this change. I think we have to recognise that this is probably the only area in Europe where we do not have proper transparency as to where the funds are going. Clearly the Framework Programme itself is not set up on a *juste retour* basis and we would resist any attempts to see it that way. It is very clearly a programme designed to support the best research wherever it comes from. We would like to see these figures in time for us to be able to manage our own reactions to the programme, to manage our own activities in the sense of are we getting the right people involved, are we getting enough of the right people involved, what is going wrong with it if we are not. We have got good researchers and we want them to be engaged, but in response to the Commission we have taken the line that Member States have to be mature about this and to try to understand it is not a *juste retour* programme. Nonetheless, we need the information to manage ourselves properly. As we say in the paper, we are still pressing the Commission to provide this information.

45. Can I go on, my Lord Chairman, to ask Mr Wright whether he thinks there are constraints which affect the United Kingdom participation or hopeful participation in this programme? That is to say you have already said that participants have to commit their own funds if they apply for participation in one of these programmes. That is true in the United Kingdom but it is not so in other European countries. Do you think that our privatised research establishments, for example, are at a disadvantage with respect to similar institutes in other countries and for that matter do you think our universities are at a disadvantage with respect to European universities in respect of this matter.

(*Mr Wright*) There are essentially two regimes under which participating nations can obtain funds from the programme. The first is they can bid for 100 per cent of the full costs of the project to be refunded. Alternatively they can bid for 50 per cent of their direct costs or marginal costs to be refunded and up to 20 per cent of their indirect costs. This has been done because traditionally many universities, not only in the United Kingdom but also elsewhere, are not able to provide full accounts that enable them to cost their involvement in a project in full economic cost terms. But the intention is that broadly speaking the results should be the same. Clearly it depends on the balance between overheads and running costs, as it were, but there is certainly no intention to disadvantage either one group or the other because of the cost regime and certainly in the UK a number of agencies and recently privatised laboratories have worked for a fair time on full economic costs. NPL, for example, remains outstandingly successful in terms of getting projects through the programmes. I do not think there is a disadvantage in that sense. It is designed to be a level playing field.

Lord Craig of Radley

46. There is a small related point to that and that is the United Kingdom's view that the Framework Programme should be open as far as possible to researchers from third countries. I imagine third countries in this context are the EU's neighbour countries and the developing world. Perhaps you would confirm that. Is this a view in which you are having any difficulty selling to other Member States and perhaps you could explain a little bit more to us about that particular point.

(*Mr Wright*) I think our main intention in describing our wish to see the programmes more open in the United Kingdom position paper was as much to address and engage industrialised countries as engage the developing world. Again the European Community has support measures for aid for developing countries and that money can be used to support research infrastructure in those countries if they wish. But the openness point is much more about allowing projects to bring collaborators from industrialised countries into the framework and that is a subject which is receiving some resistance from other Member States who I think are somewhat more protectionist than we would be. We see no advantage in excluding the best Japanese researchers from the IT programme if we are thereby cutting off our nose to spite our face. That is something other Member States find harder to accept.

47. Can you point to any particular Member States taking a very restricted view in this area?

(*Mr Wright*) Certainly the French have been quite opposed to what we say.

Lord Porter of Luddenham

48. Looking at Germany's suggestion about restricting the programme to certain Member States, which is what we are talking about, do the programmes go to support Member States or do they go to support individuals? I was under the impression that groups of individual scientists are the applicants and hopefully the recipients. Programmes do not go to Member States, do they?

(*Mr Wright*) My Lord Chairman, that is precisely right and we have ourselves some difficulty in understanding what the German proposal was in this area. As I think the question recognises, the programme operates at two distinct levels, the level of Member States and the level of Member States' researchers. It is open at any time for Member States to collaborate with each other on major programmes, for example in ILL or ESRF or in many of the telescope collaborations. We see no need for those collaborations to be brought within the

Lord Porter of Luddenham *contd.*]

Framework Programme. It is difficult to see any advantage in bringing them in the Framework Programme in the sense described in the German paper, under Article 130k, if there is not going to be any European money attached to it. We have some difficulty understanding that. At the level of researchers, which your question also touches on, there is no obligation to involve all Member States' researchers in every programme much less in every project. It is difficult to see the benefit of excluding some Member States' researchers from the programme as again the German paper implies.

49. In my experience, one of the really positive advantages of the Framework Programme has been the bringing together of scientists who perhaps did not know each other in the first place. It is a condition in some of the programmes that you share with at least two other countries in Europe. This, I think, has been very beneficial. This makes nonsense of talking about grants to the Member States because these individual scientists are all from different Member States.

(*Mr Wright*) We have pressed the Germans on this point and I think they now believe they have misconceived what can be achieved and are reconsidering their position.

Lord Haskel

50. I wonder if I could ask a question about the Joint Research Centre. In paragraph 57 of your paper you say that the future status of the Joint Research Centre, in your view, needs to have the flexibility of agency status to perform efficiently and competitively. I wonder why you believe this and I wonder if this view is shared by other nations.

(*Mr Wright*) The government certainly believes that agency status will offer two benefits to the JRC. First, it would allow the setting of more explicit performance targets which could be monitored more effectively by Member States and the Council and by the Commission. Secondly, and perhaps even more importantly, it would allow financial, personnel and staffing policies to be evolved which are appropriate for a research organisation rather than appropriate for an administrative organisation like the Commission. Specifically, we believe that a JRC which is capable of delivering the sort of results we want must be able to evolve its skills and expertise flexibly to meet new needs. The Commission has recently adopted a policy where 40 per cent of all staff must be permanent staff and they have applied this to the JRC. At the moment only 32 per cent of staff are permanent so the move from 32 per cent to 40 per cent will reduce the flexibility of the JRC. The board of governors raised this with the Commissioner and she said it was a Commission wide policy she was unable to influence specifically. That is one very good reason for having the JRC designated on a different basis. Secondly, we believe the financial accounting arrangements in the JRC need to be made a great deal more transparent. At the moment there is enormous scope for marginal pricing and internal cross-subsidy which can give the JRC an unfair head start in competing against other organisations. Sir John Cadogan, as Director-General of the Research Councils, is our member of the JRC board and he has raised this point forcibly with them on many occasions and has achieved considerable support from other Member States. The difficulty is moving the Commission a step forward.

51. You say considerable support from Member States. Could you be a bit more explicit. Is that really to do with applying for money competitively?

(*Mr Wright*) Yes, it is the two aspects, first to make the JRC more competitive and to have to compete for the funding it gets and second this question of having it managed on a proper basis so it can compete more effectively so that it can manage itself in a way more appropriate to a research organisation. We have had strong support on both those counts.

Lord Phillips of Ellesmere

52. I wonder why the government is pressing for agency status rather than a Prior Options review.

(*Mr Wright*) My Lord Chairman, that is a question which I had not anticipated! I think in a sense we have done the Prior Options review and in pressing for agency status that is, if you like, the minimalist step. We would see that as the first step in getting the JRC on to a basis in which it can be managed effectively.

53. You are content there is a need for such a network of European institutes?

(*Mr Wright*) The JRC is doing important work in support particularly of Commission policy as well as the work that it is bidding for within the Framework Programme itself.

Chairman

54. Just explain to me because I think there is a point behind what Lord Phillips was saying which escapes me. It is an in-house capacity for research for the Commission, as I understand it, and yet the government takes the view that increasingly in-house research is an embarrassment to governments and it is much better to leave it to other people to do. What is the difference?

(*Mr Wright*) My Lord Chairman, I cannot concur with the way you characterise the government's position on research establishments. I do not think there is a difference. In exactly the same way government is trying to get the best management and best value for money for research within government it should be trying to get the best management and best value for money within the Commission's capability. It is very much part of the same picture.

55. You are confident that the JRC can give best value?

(*Mr Wright*) I think one would have to say at this stage that we believe the JRC should be looking to address the particular issues of good management and added value raised by the board and by other Member States.

Chairman] I take that as negative I think! Lord Dixon-Smith?

Lord Dixon-Smith

56. My Lord Chairman, Mr Wright has mentioned the issue of industrial participation in these programmes. The question is whether he would agree that an increase in corporate R&D is liable to have more impact upon competitiveness than funds mediated through the Commission. Following on from that has the Commission or should the Commission be looking at ways of routing the funding to make sure that that sort of involvement is actually taking place?

(*Mr Wright*) I think certainly, my Lord Chairman, we would say yes we want to see firms invest more in R&D. That is where there is the potential to contribute best to innovation and increase competitiveness, jobs, wealth creation and quality of life. The Framework Programme as presently constituted does indeed encourage firms to invest in R&D in so far as the funding comes on a matching basis. Firms that want to participate in the programme are encouraged to invest their own money to work collaboratively in Europe. Beyond that I think it is very difficult to see what the Commission can do to encourage greater investment in R&D using a research programme and I think we have some concerns that, in some of the things that the Commission has said, they would tend to move away from a research programme without too much thought as to what they could achieve with the money in any other way. I am not sure that is a terribly direct answer but in a sense there are limits on the Commission's capabilities and powers in this area which we would be keen to maintain, for example they have no role in fiscal policy. Beyond that we have yet to see proposals from the Commission on how they could spend money to increase corporate investment in R&D.

57. It is that last particular point, my Lord Chairman, I was trying to address. I seem to recall in Germany in the summer when we were talking to some of their government ministries that they indicated that their preferred route for, if you like, government funding into research was via and through industry. I wondered if the same sort of criteria should not be applied to a programme of this nature.

(*Mr Wright*) The programme is attempting to do a wide range of things, as we have recognised. I do not think we would want to see necessarily the requirement to have industry involved in every project or the requirement to gear the programmes solely to industry in that sense. I am not quite sure what the German proposition is as to how one would change the Framework Programme to achieve what they are trying to achieve. I have difficulty myself in seeing how one would achieve the objective of getting firms to invest in R&D through this sort of mechanism.

Baroness Platt of Writtle

58. You mention in your paper there might be a place for imitation, as it were, in the Framework Programme of our Technology Foresight exercises and also the Teaching Company Scheme which might take up Lord Dixon-Smith's suggestion. Are you getting any encouragement for that in Europe?

(*Mr Wright*) As regards Technology Foresight we would like the Commission to do more to lean on work done not only in the United Kingdom but also in France and Germany in particular and in the Netherlands, to identify the technologies we need for the future and we would encourage the Commission to do that. At the same time we do not think it would be right for the Commission to do a pan-European Technology Foresight exercise partly because it would be monstrously bureaucratic no doubt and we are not sure it would reach any sensible conclusion. On the Teaching Company Scheme that is something that relates very much to the Training and Mobility of Researchers Programme and perhaps Mrs Allan could come in.

(*Mrs Allan*) At present the Training and Mobility of Researchers Scheme is very highly regarded and very effective but the fact is the participation there is predominantly academic and almost overwhelmingly so. We have had a lot of comments (and I know they are shared elsewhere in Europe) that it ought to have a higher industrial participation and we shall be looking in the negotiations going up to Framework 5 to find ways to achieve that. We have been consulting widely with industry here and also speaking to the Commission and other Member States and we believe there is a good deal of sympathy for finding ways of improving the administration of the programme so industry will find it easier to take part. Industry is not excluded at the moment but the processes are very long and the procedures are not particularly well geared towards industry. A number of ways are being explored (and we think we shall certainly be putting them to the Commission, where we have already found a reasonably sympathetic response) for adjusting some of the procedures to make them more friendly to industry. For example, one possibility could be a return of so-called institutional fellowships which allow the organisation which bids for the funding to have more flexibility in the choice of the fellow to recruit at the end of the day. That is one pathway we are exploring.

59. Very often the best way of technology transfer is for industry to take on the bright young researcher because that is the way the transfers get put into development terms.

(*Mrs Allan*) Yes. We would certainly want to see industrial hosts much more strongly represented in the Training and Mobility Scheme, either through as I mentioned, a return of the so-called institutional fellowships, which in fact give you an easier route, or through mechanisms aligned in some way close to either the Teaching Company scheme or the Research Councils' CASE Schemes the common feature of which is a partnership between universities and industry for development of the young person concerned.

Chairman

60. The last question on the questions list we submitted refers to the problem that the University of Edinburgh drew attention to, and now the Committee of Vice-Chancellors and Principals, about VAT and if I can read out what the Committee of Vice-Chancellors and Principals said to us, "Under FP4 funding between the EU and the UK

Chairman *contd.*]

universities is deemed to be outside the scope of VAT. This is because the funding is provided for "the common good" rather than a contract for the supply of goods and services." The result is that the EC refuses to pay VAT on projects because they claim they are exempt and the universities are having to carry the cost themselves. Is that a correct summary and would you like to comment on it?

(*Mr Wright*) My Lord Chairman, yes, it is a correct summary, and I think it is a tribute to the power of the Committee that since we have had this issue brought to our attention steps have been taken to resolve it. Our colleagues at Customs and Excise, who have responsibility for the problem, have already started to negotiate a way forward with the relevant Directorates General in the Commission, which will mean that universities should not be burdened in future with a need to reclaim VAT from the Commission. By dint of a sensible arrangement between the Commission and Customs and Excise, this problem should disappear very shortly.

Chairman] I think I can assure you that if it has not disappeared by the end of our enquiry, we will be referring to it in trenchant terms. Are there any further questions any Member of the Sub-Committee would like to put?

Lord Phillips of Ellesmere

61. You make no mention anywhere of advisory systems in the process. I wonder, does the United Kingdom have a view on the European Science and Technology Assembly?

(*Mr Wright*) The European Science and Technology Assembly is playing an important role, I think, in helping the Commission to understand the particular needs and interests of the scientific community. We have, however, in our paper, as the Committee will have seen, stressed that we want to see much greater use of advisory bodies in the development of the next framework programme and in its evolution as it goes forward. The point there is not so much to represent any particular grouping of individuals in Europe in the way that ESTA does but to try to represent the needs of the users of the research so that the problem is managed and developed more formally with those needs in mind.

62. The Commission does have an advisory committee drawn from industry?

(*Mr Wright*) Indeed it has, called IRDAC, which again, I think, serves a similar role but with a different complexion to it.

63. Do we approve of that?

(*Mr Wright*) Again it seems to do a good job in advising the Commission on industry's views, yes.

Chairman] I think we have run out of time. You have been very patient with us.

Lord Craig of Radley

64. Could I ask a very straightforward question. Mr Wright, you mentioned in your reply to one of my questions that there was a paper looking at the Fourth Framework Programme's value. Could that be made available to us when it comes out? I do not know if it is going to come out in a month or two's time?

(*Mr Wright*) Yes, indeed, we can certainly do that.

Chairman] Thank you very much. That raises the further point that I suspect as we progress into this enquiry there might be other issues that we might wish to come back to and invite written evidence or answers to any questions we might have. If we might do that we would be grateful. Thank you, Mr Wright, and your colleagues for your patience with which you have answered for some considerable time our questions on the Framework Programme. We are most grateful to you.

WEDNESDAY 13 NOVEMBER 1996

Present:

Craig of Radley, L.	Selborne, E. (Chairman)
Gregson, L.	Soulsby of Swaffham Prior, L.
Haskel, L.	
Nathan, L.	Butterworth, L.
Phillips of Ellesmere, L.	Lewis of Newnham, L.
Porter of Luddenham, L.	Platt of Writtle, B.

Memorandum by Policy Research in Engineering, Science and Technology (PREST)

The attached submission, on behalf of Policy Research in Engineering, Science and Technology (PREST), University of Manchester is based upon our experience with the Framework Programmes since their inception in the following capacities:

- Participants (in Targeted Socio-Economic Research Programme, Human Capital and Mobility (as co-ordinator), SPRINT/Innovation);
- Evaluators (currently chairing five-year assessment of Biotechnology Programme, past evaluations of Framework 2 and of Impact of the Framework Programme upon the UK (UK/IMPACT study);
- Policy studies (covering diverse topics including recently intellectual property arrangements, prospects for a European Foresight programme and co-editing European Report on Science and Technology Indicators).

DIRECTION

1. *What lessons should be derived from the Fourth Framework Programme?*

2. *Should there be a Fifth Framework Programme? If so, what should be the main objectives or focus and how should the priorities be set?*

3. *What should be the balance between basic and applied, pre-competitive and near-market research funded through a Fifth Framework Programme?*

(a) The Framework Programmes have been characterised by an inability to concentrate resources on priority areas. While some areas such as nuclear energy have declined, the general pattern as the budget has grown has been to add further areas. This has resulted in resources being spread too thinly both between and within programmes.

(b) A further point in relation to the Framework Programme is that, in essence, the policy instrument it represents has been unchanged for 12 years. No Member State has maintained RTD policies unchanged for this period. In general, most national governments have pulled back from this form of funding (50 per cent funded shared cost projects) in favour of an increased emphasis upon setting their RTD policies in the context of broader innovation policies. The latter have a great focus upon providing firms with the capabilities to make use of scientific and technological knowledge. At a minimum the Framework Programme should have a much more integrated approach between its support for RTD and its support for innovation. The present separation between at least three Directorates-General institutionalises an implied acceptance of the linear model of innovation rather than fostering interaction between knowledge creation and application.

(c) The latter does not mean that the Framework Programme should not support strategic scientific research. In areas such as biotechnology, large firms are clear that their priority is for academic scientists to perform high quality research. However, small firms favour a nearer-to-market approach, suggesting again the need for a greater variety of instruments.

For the Fifth Framework Programme (using this term to describe the broader package of activities which we believe should follow), a key issue will be the need to recognise the trend to globalisation of industry which has occurred since the early Framework Programmes. These were originally constructed to support a distinct European industry. Fresh thinking is necessary to support a European presence on technologies which are global. At the scientific end of the scale international collaboration, particularly with the USA, is likely to be highly beneficial. Balancing the global support for scientific research should be a more targeted effort to ensure that results are exploitable in Europe and that companies have an incentive to keep their technological activities here. The Framework Programme should more explicitly address strengthening the European infrastructure.

It was notable in the UK Foresight Programme Delphi survey that topics considered most suitable for European collaboration were heavily concentrated in defence and aerospace, transport and research supporting the Commission's policy and regulatory functions. High technology sectors (IT and biotechnology) were usually rated as most suitable for global rather than European collaboration, reflecting the reality of the global companies operating in these sectors. The high rating given to defence and aerospace topics reflects very extensive collaboration outside the Framework Programme but also suggests some scope for explicit inclusion of dual-use technologies.

Finally, as participants we welcome the inclusion of the Targeted Socio-Economic Research Programme in the Fourth Framework. This promises good results in spite of poor management by the Commission, in particular the frequent changes of responsibility and the failure to fill key positions. Most of the priority themes being discussed include substantial social science elements and this area should remain a priority in the Fifth Framework Programme.

4. *What should be the role of the Task Forces in a Fifth Framework Programme?*

The Task Forces have demonstrated the value of having cross-cutting unifying themes. The criticism here is of the somewhat arbitrary way in which the topics emerged. The Task Forces would have had far greater legitimacy had they emerged from a consultative prospective exercise, in effect a Foresight Programme. However, while there are many attractions in the idea of having a European Foresight Programme, a major barrier exists in that the present agenda setters (Council, Parliament and Commission) would be unlikely to give full commitment to implementing its results. Without a means of implementation a sterile and academic exercise would result. The conclusion is that far broader reform is needed in the ways in which the agenda for the Framework Programme is set.

5. *Can it be demonstrated that the UK gets clear value for money from participation in the Framework Programme and, in particular, what has been the impact on industrial competitiveness, social and economic sectors?*

In 1992 PREST carried out an extensive review of the impact of the Framework Programme upon the UK (the UKIMPACT Study). This concluded that the principal impact was to re-orient the research community in the UK to a point where it regards itself as a part of an emergent European scientific community. It also found that it was too early to assess economic and social benefits. While the importance of a well-integrated research community should not be under-estimated, it would now be timely to assess the extent to which this integration has led to subsequent socio-economic benefits.

PRIORITIES

6. *What should be the role and priorities of the Joint Research Centre, and how should its activities be funded?*

Contrary to the policy direction in the UK, there remains a rationale for the existence of public sector laboratories especially in areas where government and the public require independent advice to support regulatory activities. The Commission may reasonably consider that it has a responsibility to maintain capabilities to support its policy roles. However, this rationale does not mean that the Joint Research Centre should lead a privileged existence compared with other European laboratories. It should have to compete for the bulk of its resources on a level playing field with alternative suppliers.

7. *How should the EU meet its "cohesion objective" of enabling SMEs and Member States with less scientific expertise to benefit from the Framework Programme, while ensuring that the highest scientific standards for EU research are met?*

While most UK researchers and policymakers agree that research resources should be allocated on the basis of excellence, it is unrealistic to expect that cohesion countries will accept this position unless they are persuaded that adequate alternatives exist. Again, an innovation policy orientation would provide scope for this by providing means other than research funding (technology transfer measures, project-linked fellowships etc.) for the acquisition of scientific and technological knowledge.

FUNDING AND ADMINISTRATION

8. *Does the European Commission have the adequate expertise and the mechanisms to support the Framework Programme?*

For more than a decade evaluations of the Framework Programme have reported profound dissatisfaction with the contractual procedures which support it but there is no evidence of any improvement, and even some suggestion that delays have worsened. The technical part of the selection process (evaluation) though the most complex is not the mostly time-consuming. Rather, the delays lie in the post-selection phase inter-service consultations within the Commission, so-called negotiations (in which researchers have little or no opportunity to negotiate) and the issue of contracts.

It is clear that palliative measures are insufficient to deal with these problems. Root and branch reform of the Commission is necessary, re-engineering the organisation and eliminating antiquated hierarchical practices. Individually talented staff are unable to function effectively in this structure. That this goes beyond the research Directorates-General should not inhibit pressure for action.

A more specific concern exists in the area of programme evaluation. Under pressure from CREST an apparently improved monitoring and evaluation system was put in place with more pertinent terms of reference than in the past. Regrettably, the implementation of this new system has been highly unsatisfactory. Panels were convened at very short notice, given no resources for serious data collection and asked to report within three months. Most have complained strongly at these conditions. The requirement for evaluations was known some time ago—there is no excuse for this badly mismanaged implementation.

9. *Is the current length of the Framework Programmes too long and would they benefit from shorter time frames with more flexible funding? Alternatively should the Programmes be longer?*

There is a difficult trade-off here. Long programmes cause work programmes to become out of date but projects in longer term areas such as Biotechnology need more than three years to come to fruition. A further argument against shorter programmes is that the immense bureaucracy on the part of the Commission and Member States involved in launching a Programme should be as infrequent as possible. One way forward would be to make the work programmes themselves less prescriptive and more flexible to keep up with new developments.

10. *Should Task Forces have earmarked funds to support their own research programmes?*

No comment.

11. *How should the UK allocate funding for the Framework Programme and other EU research initiatives to ensure that UK researchers are not disadvantaged?*

The application of additionality principles through the EUROPES system has a clear theoretical logic in terms of ensuring co-ordination between national and EU programmes. However, the theory breaks down in practice as the size of the framework programme inevitably is set as part of a compromise with other Member States who have no such restriction. While the mechanical relationship can be (and is) over-ridden, the premise that activities should be carried out and either at national or European level is also questionable. Often the best way to ensure exploitation of European results is to reinforce complementary national activities in the same areas.

Examination of witness

PROFESSOR LUKE GEORGHIOU, Director, PREST, called in and examined.

Chairman

65. Professor Georghiou, we are grateful to you for joining us today. We are aware that PREST has had considerable experience and a long-running relationship with the European Union Framework Programme over some years so we are most interested in what you have got to tell us. Is there anything that you would like to say by way of introduction before we put some questions to you?

(*Professor Georghiou*) My Lord Chairman, no, only to thank you for inviting me to amplify our written evidence.

66. Good, then let us start by my asking the first question, which refers to the priority areas and you are critical of the ability of the European Union Framework to determine its own priorities. Would you like to explain why you think that they have failed to determine the priorities?

A. Yes, my Lord Chairman, I believe that the Commission itself would argue that there has been substantial change in priorities, for example, a cutback in the relative importance of energy programmes and an increase in information technology and later on an increase in industrial technologies, biotechnology, plus the introduction of

Chairman *contd.*]

new areas. However, this is all relative and if you look at the actual expenditure it has increased in all areas, so even in energy, which is given as the example of an area cutback, the magnitude of spending is about a quarter as much now as it was in the First Framework Programme. Information technology has increased by half since the Second Framework Programme. The newer priority areas have increased by much more, but there seems to be a situation where once something is in place it cannot be cut back or removed from the Framework Programme.

Lord Gregson

67. Is this not a case that many of these programmes are rather long term programmes and once they are funded by contract, which they are with the European Commission, when you say that you are not going to fund any more, it takes a year or two years to run them down anyway, does it not?

A. That is true of any Framework Programme, but in principle from one Framework Programme to another there it could be that—

68. I was thinking particularly that some of the contracts on energy were three-year contracts.

A. Yes, but that would still fall within a single Framework Programme. They would not be allowed to commit funds beyond the life of that programme.

69. True. You say that resources have been, and I quote, "spread too thinly both between and within programmes", and you refer to the German comments with regard to major countries, good science and the impossibility of incorporating small countries with the lack of facilities, etcetera, then you go on to say that small firms favour a nearer to market approach. How do you reconcile these two things in effect?

A. These were separate points. The point about resources being spread too thinly is borne out by the high failure rate of applications to the programmes and also by evidence. I should say in parenthesis, my Lord Chairman, that I have recently been chairing the five year review of the biotechnology programme and much of my evidence comes from that. We found in that review that it is large projects which have the most impact, for example, the well known case of the yeast genome, but there are others—lipases, lactic acid—which are the largest projects in the programme and also have the most impact. That seems to indicate that where resources are concentrated more effect relatively can be achieved. The point about small firms comes from evidence again received in a number of evaluations and these suggest that there is only a very small minority of high technology small firms who perform the type of research which is in the Framework Programme, and even the majority of technology based SMEs cannot afford either the overheads or the long time scales for exploitation which most Framework Programme activities offer. However, rather than give them alternative instruments of support, great effort goes into trying to help them apply to and participate in the Framework Programme. Our point was that these firms would benefit more from assistance with project development or acquisition of technology from outside the firm—licensing and so on.

70. In your comments you indicate that it is a costly way of doing research if they cannot afford the overheads involved. Do you feel that it is a more costly way of carrying out the research? A small company in a UK scheme would not find the disadvantage that you are talking about. Is it because it is within this programme it has got to be an international or a European programme and therefore the overheads are very high?

A. Yes, there are both costs and benefits to collaboration, but the costs tend to be up front (the costs of making applications, of holding up your work while you wait for an unpredictable period to get a response from the Commission and so on) whereas the benefits come some way downstream when the results are exploited.

Chairman

71. You mentioned that you have been involved with biotechnology programmes for five years. Was the yeast sequencing a part of the biotechnology programme?

A. Yes, my Lord Chairman.

72. Would you like to comment on which of all the different programmes in the biotechnology programme has been the most effective?

A. The biotechnology area has been characterised by some swings in policy. The BRIDGE programme, going back to the Second Framework Programme, had a relatively high industrial participation. The Biotech I Programme in the Third Framework had a strong drop in the level of industrial participation; it was a much more science based programme to the point that industry appeared much less interested. The Fourth Framework Biotech II Programme has reverted to the position of a high industrial participation. Therefore, they cannot be seen as all one programme. None the less, the most successful projects—I mentioned earlier that they tended to be the large ones, my Lord Chairman—were also characterised by some continuity between Framework Programmes. They were often present in two Framework Programmes or even three Framework Programmes before they reached their results, which suggests that long term support is necessary for some of these activities.

Lord Lewis of Newnham

73. My Lord Chairman, certainly one of the aims, if I understand it correct, of the whole of the Framework Programme concept was to help the SMEs to become competitive in the long term, not in the short term. How far do you think that this has been a success? In other words, if we look at the distribution within industry, you have the large industrial group which clearly has been benefiting and you have the SMEs, which are the other side of it. Are they benefiting to any large extent? It may well be that this is specific to various areas of the programme.

Lord Lewis of Newnham *contd.*]

A. Some SMEs are benefiting, but it is a fairly small proportion even of technology based SMEs. You would not expect the programme to affect other types of SME. In the evidence that we received in the most recent evaluation we found that there was a clear difference in the demands made by large companies and SMEs. Large firms in the biotechnology sector supported the kind of longer term research which was going on in the programme and were well equipped to make good use of the science base. The pressure from SMEs was for much nearer market work which would result in a clear product at the end of the project, a type of project which is outside the remit of the present Framework Programme.

Lord Soulsby of Swaffham Prior

74. With respect to the successful large projects and the fall out of applications that were unsuccessful, is there a relationship between the size of the firm and the success of proposals going through the Framework Programme?

A. I am afraid that I do not know the answer to that, my Lord Chairman. The statistics should be available from the Commission. I believe that the participation is fairly even between large and small firms.

75. I just wondered whether the small firms were inexperienced at putting in what you might call successful proposals compared with the big ones?

A. Yes, there are certain schemes (there is one within the Biotechnology programme) which help them to do preparatory work towards an application, to try to increase their chances of making a successful one, but these schemes are relatively recent so it is quite hard to tell how well they have worked.

Lord Gregson

76. On that point, my Lord Chairman, there is a certain amount of evidence that the Commission have bent over backwards to bring in the small companies quite deliberately, part of another programme, if you like, and therefore small companies are brought in really to make up the numbers rather than to contribute to the research. Is that apparent in this situation, do you think?

A. I cannot comment on individual cases of that happening, but certainly they receive a very high political priority whereas exploitation of this type of research is probably predominantly by large firms.

Lord Phillips of Ellesmere

77. My Lord Chairman, I wonder whether there is a danger in talking, as we are talking, about industry as a whole when there are really large differences between, as I see it, small and medium enterprises in, say, the biotechnology sector and the information technology sector. Do you see sector differences as being properly looked after?

A. Yes, my Lord Chairman, I am sure that that is an important point. I believe that there are probably some problems emerging with the intellectual property arrangements which have been largely developed with information technology and manufacturing and which do not work as well in biotechnology. That would be one example of a sector difference. There are also national differences. The United Kingdom is unique in Europe in having a dynamic entrepreneurial small firms sector in biotechnology; the others countries do not have this. Ours is not as strong as the American one but none the less that is a difference.

Lord Nathan

78. How far do you find that SMEs coming into biotechnology programmes are really put in touch with a broad range of others in the same field and how far is the inducement effective?

A. It is really more typical of large firms that they enter these programmes to keep in touch with developments.

79. That is why I asked the question.

A. Small firms tend to go in only when they have very specific and narrow objectives. In areas other than biotechnology often their most successful participation is when they are working with their eventual customers. Perhaps they are making a component and a larger user is involved in the same project. That configuration with academic partners as well is often the most successful for them to work in.

Lord Soulsby of Swaffham Prior

80. My Lord Chairman, with respect to research needs, who is responsible currently for assessing Europe's research needs as opposed to a Member State's research needs within a European context?

A. That is a very difficult question. It is a highly complex process whereby the Commission synthesises bottom up inputs coming through programmes and participants, inputs from Member States which come both at a high level and through programme committees, advisory inputs from committees, inputs from the Commissioner and her Cabinet and, further on in the process, negotiations with the Council and with the European Parliament, so it is very difficult after all that to attribute the origins of particular ideas. To answer the question more directly, my Lord Chairman, within this process I believe that there are no wholly disinterested bodies carrying out the function that you mention, but one would expect that the European institutions, and notably the European Commission, would have the strongest interest in performing that particular duty.

81. And it is a certain Directorate General that eventually makes the decision?

A. Directorate General XII has the responsibility for producing the programme, but that has to be in consultation with the other Directorates General, and in particular those that manage parts of the programme, Directorate General III and Directorate General XIII.

Lord Soulsby of Swaffham Prior *contd.*]

82. And Europe in this context is the European Union, is it, or is it wider than the European Union?

A. It is very largely the European Union. There is a part of the programme which is concerned with co-operation in central and eastern Europe and considerations are wider there, but even then the decision is made by the European Union.

Lord Porter of Luddenham

83. You spoke exclusively about inputs of various kinds on which the decisions were made, but needs are not inputs, are they? Inputs presumably are demands for participation and for grants, would you agree? Does somebody look specifically at Europe's needs for research as opposed to what the various countries want? They are their inputs, are they not?

A. Well, perhaps this takes us into the debate as to whether there should be some sort of European Foresight Programme which is looking more systematically at needs. My colleagues in PREST recently completed a study for the Commission which examined the prospects for a European Foresight Programme and offered a set of scenarios ranging from no change to having a full-scale exercise. My own view is that those complex decision making processes which I have just outlined could not accommodate an action—oriented Foresight Programme of the type that we have had in the United Kingdom, one that really does connect to policy. It would be much more likely that we would end up with something more like the German or French exercises which provided background information but did not have this policy connection. On the other hand, there is a gap correctly identified and activities such as the selection of the Task Force areas do appear to be very arbitrary at the present time. There should be a more systematic process for identifying areas to be explored in this way.

Lord Craig of Radley

84. My Lord Chairman, perhaps I may just go on from that and ask how support for innovation and research should be integrated to provide a proper focus for wider exploitation of results. We have had a lot of criticism of the resource allocation, but there clearly is a need to improve the arrangements. It would be interesting to hear what you have got to say about that.

A. The first point is to note that different parts of the Framework Programme and projects within those different parts do have a range of objectives. Some activities do not relate directly to exploitation. However, of those that do, the great majority—at least 80 per cent, I would say—are most likely to be exploited by the firms who are already taking part in those projects and therefore the emphasis on dissemination of results seems strange, even counter-productive, at times. One thing which has emerged from our recent evaluation is that there should be more emphasis on support for exploitation by single companies. Partners almost always exploit their results on their own rather than collectively, but in some areas it is very hard even for them to take part if there is a competitor present in the project. For the remainder of the projects such as those concerned with standards, for example, there certainly should be strong efforts to disseminate the results to those capable of using them. That is one issue, my Lord Chairman. A second issue which we pointed out in our written evidence is that there is presently a separation of responsibilities within the Directorates General and responsibility for exploitation is not only in another Directorate General but in another country, Luxembourg. This seems to institutionalise the linear model, in that somebody produces research results and then somebody else goes and tries to find applications for them. It would be far better if exploitation were seen as an integral part of the duty of those managing the programmes and built in at a much earlier stage than it is.

85. But you did, I think, earlier in evidence suggest that all the Directorates General interact in allocating priorities and discussing priorities although Directorate General XII has ultimate responsibility. Does that not in a way overcome this criticism that you have just made?

A. Clearly there is co-ordination and nowadays there is a single Commissioner responsible for these areas. None the less within any bureaucratic organisation separations of this kind do reduce efficient working.

Lord Lewis of Newnham

86. My Lord Chairman, if I may just come back to part of Professor Georghiou's answer to the last question, that is the situation in a large company looking at the programme and the difficulty of sharing. Now, of course, in many instances, as you rightly pointed out, the large companies are now becoming global rather than European companies, and you do suggest that this must be recognised in the actual Framework Programme. How realistic is it now to think of these companies as other than global companies—I mean, you really are going to get participation from perhaps Japan or the United States, and you do state that you see that this could be a benefit—but how does this fit in with the European concept?

A. Perhaps when the Framework Programme began in the 1980s and companies were more distinctively European you could assume that what was good for companies was also good for the European taxpayer. That is no longer automatically the case, so if we are investing the European taxpayer's funds it is more important to target the behaviour of those companies to encourage them to continue researching and manufacturing in Europe. This would suggest perhaps a shift in emphasis within the programme towards creating the conditions that encourage them to do so, including strengthening the research infrastructure and academic-industrial links as opposed to industry-industry links. Also at a scientific level globalisation has become significant. If we confine collaboration to within Europe we are not always working with the world's best. I have also recently taken part in an evaluation of the Human Frontier Science Programme, which is a rare example of global collaboration with the United States and Japan. That

Lord Lewis of Newnham *contd.*]

has been highly successful and beneficial to all concerned. I think that we should see more of that type of activity supported by the Framework Programme.

87. My Lord Chairman, my worry is that you are saying that there is a problem with the large firms and you are also saying that there is a problem with the SMEs. Where do we find ourselves as a result of this?

A. I am certainly not saying that we should not support the large firms, my Lord Chairman. I am saying, however, that we should examine that support very carefully and ensure that there is an explicit return to Europe from the support that they are given in particular circumstances.

Lord Gregson

88. If I may just continue on that, my Lord Chairman, some time ago there was quite a bust up on the question of giving research work to ICL because they were then controlled by Fujitsu, but in fact there was a long discussion—and I took part in it—where there were conditions laid down for allowing them into a programme. What I am saying therefore is that this already exists and it has been applied.

A. Yes, there are already examples of this, but we also have a situation now whereby both Germany and the Netherlands, I believe, have enacted schemes to try to encourage their industrial research and development laboratories to remain in the country and not move to cheaper locations. This could be a challenge that all of the more advanced European countries could face, so again we have to think of designing incentives for them to keep that work here. This is a newer development than the ICL-Fujitsu type situation.

89. Is that a very good thing in a very high cost situation like Germany?

A. It is in the interests of the German taxpayer that they should remain there.

90. It is not in the interests of competition though, is it? Germany is moving some of its research to the United Kingdom, for instance?

A. Yes, we could benefit, but on the other hand one could foresee a situation where research is carried out in India or even China, for example.

91. But say it was in the Community, is it a bad thing?

A. No, within the Community I would certainly support a competitive situation.

Lord Nathan

92. There is a question with regard to the management and the potential results of the Targeted Socio-Economic Research Programme in the Fourth Framework. Have you any comment on that, the management and potential results?

A. Yes, I think that there is a general perception that the management, at least in the past, has been rather poor. There were frequent changes of responsibility for the programme, a failure over a long period of time to fill key positions in the programme secretariat and an initially confrontational relationship with the programme committee. I think that it was probably quite hard for the Commission to adapt to the idea of having a programme in social sciences; they tended still to think that it was a set of consultancy contracts that they were used to giving. However, the situation does now appear to have improved and despite these difficulties I would say that the programme does address three important problem areas. To my knowledge it has attracted some first rate social science researchers, including many from the United Kingdom, to take part in it. In terms of the use of results I should reiterate that it is research and not consultancy, so it will take some time for these results to have an impact. However, they are likely to be more soundly based and of higher quality than shorter term work would produce.

93. What is your time scale for seeing what the potential results really are going to be? Is it worth the exercise at all?

A. These things are always out of phase. The present projects have got a year or two to run, so allowing for producing their results in a form suitable for users, one would expect to see effects closer to the end of the next Framework Programme rather than this one, in time for decisions about long term follow ons, but not in time for decisions about the Fifth Framework Programme.

Lord Lewis of Newnham

94. You touched on the problem that is worrying me slightly, my Lord Chairman, when you mentioned something about staffing problems. Can you comment in your experience on what has been the background staffing for these various programmes? Have they been sufficient, have they been staffed by permanent people or have they been staffed by temporary staffing? What is the totality of the staffing problems?

A. I think that this was a rather isolated case. Generally there has been fairly good continuity in the more established areas of the Framework Programme. My impression is that, as individuals, Commission staff are generally of high quality, and this appears to be the perception of the researchers whom we speak to in evaluations. The problems come from the structures within which they work rather than the people that they employ.

Chairman

95. What is wrong with the structures within which they work?

A. This goes well beyond the scope of research, my Lord Chairman, but the Commission has a much more hierarchical system than our own Civil Service. It is very difficult to delegate any powers at all. All commitments even of the smallest kind have got to be personally authorised by Directors General and letters have to be countersigned by people one or two grades up the system. All of that as a basic background creates a rather sclerotic bureaucracy. Beyond that, more or less every evaluation over the years, and certainly the most recent batch, has been

Chairman *contd.*]

very heavily critical of their contractual procedures, and yet by real indicators such as the time taken to produce these contracts, performance does not improve. More worrying too there has been a shift in the cause of these delays away from the more difficult activities such as scientific assessment of proposals which is now done fairly efficiently and towards other activities such as what the Commission calls inter-service consultations (receiving approval from other Directorates-General and the Commissioner's staff), from what are termed "negotiations" with projects, which is generally informing them that they are not getting the budgets that they ask for, and from purely the time taken for the contracts division to issue contracts which authorise the beginning of work. These activities in the programme that I was looking at take some four or five months compared with three months for, as I said, the more difficult task of scientific assessment of the proposals.

96. Do I understand that you are saying that scientific assessments are no longer used in the way that they were before, that the new indicators and the new parameters under which people are operating are these much more mechanical ones?

A. No, my Lord Chairman, what I am saying is that there is a scientific assessment process and by that projects are chosen for support, but even once they are chosen there are then substantial delays in the system.

97. So that scientific assessment is continuing as before?

A. Yes.

98. But there are further complications added, that is the point, is it?

A. Yes—well, they were always there, but if anything they are getting worse.

Chairman] I think that we will want to come back to that.

Lord Gregson

99. In the early days the complications of the contracts and approvals were bedevilled by intellectual property rights and the long negotiations were always concerned with settling the intellectual property rights because people did not want to give them up, they did not want to integrate them within the Community. Is that still the case that they have long contract negotiations because of the complications of intellectual property rights?

A. I believe that in most cases that is no longer so. There are still some problem projects, but by and large companies and, indeed, academic institutions have learnt how to deal with these issues and tend to have fairly standard procedures. There has been a learning curve in how to collaborate within Europe. Such issues tend to be settled outside projects and also, I think, companies have learnt to avoid the type of projects where those issues are most likely, for example, where they may have been asked in the past to work with competitors they tend now simply not to do so.

Lord Soulsby of Swaffham Prior

100. My Lord Chairman, may we just come back to the scientific assessments of the priority ranking. With respect to the priority rankings that are drawn up by the scientific assessment committees or bodies, do they remain the same that it then proceeds through the bureaucracy that you have detailed or are there points where the priorities are changed?

A. I can only speak for the Biotechnology Programme where scientific ratings are adhered to fairly strictly. Purely on the basis of hearsay, I think that in other programmes there is more scope to adjust these rankings to take account of other criteria, including cohesion, for example.

101. And that is done not by scientific evaluation?

A. No, each programme has its own "commitology", to use the Commission jargon—yes, this is a word which appears in documents! That means that the programme committees vary in the particular powers that they have, whether they are able to intervene in project selection or whether they have a purely policy advisory role.

Lord Porter of Luddenham

102. My Lord Chairman, PREST concluded that the principal impact of the Framework Programme on the United Kingdom was to re-orient the research community in the United Kingdom to a point where it regards itself as part of an emergent European scientific community. Well, of course, it would be highly desirable if that were the case, but has it really emerged? In the experience of many of us in the UK scientific community the European scientific community has existed almost before we were born, and certainly it has gone on for the whole of this generation. Can the Framework Programme take credit for that? If it is true, it is something that certainly is a very important plus of the programme, but it seems to me that the scientists in Europe have been more integrated and more together than any other industrial communities. Has anything really happened as a result of the Framework Programme in bringing the European countries' scientists together?

A. The evidence that we had in that study was that the elite had always been well integrated but this process had touched much less on the bulk of the scientific community in this country: less senior researchers had contacts, but the Framework Programmes typically upgraded those contacts. They had not worked together before, they perhaps met at conferences or something of that kind. It was therefore an upgrading of links. We also carried out a specific study sponsored by the United States National Science Foundation to look at this and there we found that prior to the Framework Programme UK scientists had tended to look to the United States of America for their prime collaborative links; after the Framework Programme there was no drop in the level of links to the USA but a substantial increase in the number of European linkages. Indeed, UK scientists were sometimes used as a gateway to the USA.

Lord Porter of Luddenham *contd.*]

103. And how was that encouraged? Was this through grants to young scientists or the organisation of conferences? What has had an impact on bringing the European scientists together?

A. Within Europe it has been a mixture of the collaborative projects and the fellowship schemes which I think are an underrated part of the Framework Programme. They have been very effective in building up linkages. If a fellow works in your laboratory there is a long term basis for working with him in the future.

104. And that is the substance of this comment by PREST, I take it? Is that so, that those programmes have brought the scientists together in a way that they can now talk about an "emergent European scientific community"?

A. This was in 1992 and published in 1993.

Lord Lewis of Newnham

105. Are we talking primarily about academic scientists? When you say scientific communities are you talking about the academic or are you talking about the industrial as well?

A. There was industrial evidence as well, in that we found that firms were explicitly using their projects to develop European linkages and not only research linkages but also downstream linkages.

106. I think that it is important, my Lord Chairman, because there have been many other schemes—there has been ESF and NATO and various other schemes which have been operative which are primarily for the academic, not for the industrial, so I am interested to know how far this has impacted on the industrial side.

A. Yes, we did find that. The overall statistical position is that the United Kingdom is the most favoured partner. We have the largest number of collaborative links within the Framework Programme and we are the favourite partner for a majority of other countries, including France and Germany, so that is some fairly hard evidence.

Chairman

107. Is it hard evidence of the quality of science?

A. I think that it is partly driven by the quality of the science base in this country, and I would also hypothesise that it is driven by the fact that our scientific community has been leaner and hungrier because of our domestic situation and therefore has been more motivated.

Lord Porter of Luddenham

108. And do we not have a great advantage in our language in that connection as well?

A. Yes, my Lord Chairman, indeed.

Lord Lewis of Newnham

109. My Lord Chairman, we also have the fact that places like Portugal, Greece and Ireland have been very popular because of this arrangement whereby it is useful to have someone from one of the less favoured countries involved in it. I am always a little bit nervous about using statistics in this way because it is implicit in your statement that there could be other underlying features here. I do not think that it is true in the United Kingdom, but I do think that it is dangerous just to look at bare statistics. Would you agree that there have been many programmes that have had countries like Portugal and Greece and Ireland brought into them?

A. I think perhaps that situation has developed. Participants nowadays have learnt that there are good partners to be found in those countries and they make sure that they find them and these people are much in demand.

Lord Gregson

110. This must vary between disciplines, must it not? What you have said is almost opposite to what has happened in the information technology industry and the collapse of Olivetti, the disintegration of Thompsons, losses by Siemens and the subsequent contraction of Siemens operations means that all the collaboration has got to be with Japan and America, so it must vary by discipline, must it not, within a programme like this?

A. Yes, indeed, and this is an example of this globalisation effect. The idea in the 1980s that we could have some sort of Fortress Europe where we defended companies like Siemens who were largely responsible for much of the early thinking of the programme has to change in the circumstances that you describe.

111. It has changed?

A. Yes.

Baroness Platt of Writtle

112. What reforms are necessary to ensure that the Joint Research Centre continues to give independent advice and also competes on a level playing field?

A. My views, PREST's views, are that the earmarked funding for the Joint Research Centre should be reduced to the level needed for the basic infrastructure of an international laboratory, accepting that such a thing would have perhaps a higher cost base than a purely national institution, but after that to make it compete for most of its project funding and certainly for all of the funding that it gets from the Framework Programme.

113. And do you see some prospect of that happening?

A. I think that it would be heavily resisted by the Commission.

Lord Phillips of Ellesmere

114. The Joint Research Centre is rather a misnomer, is it not? We are actually talking about seven institutes distributed across five countries?

A. Yes.

115. Would you say that the Commission sees that as an important aspect in that it gives five Member States a vested interest in the so-called Joint Research Centre?

Lord Phillips of Ellesmere *contd.*]

A. It has in the past created a situation where there is at least one national champion for particular establishments.

116. Do you think that those national champions have been very effective? Do you think that they have been more effective than they should have been?

A. To the extent that the Joint Research Centre is consuming a larger budget than Member States collectively consider that it should be, that would be an indicator of this effect.

Chairman

117. It has been put to us in written evidence from a European source that it is important for the Commission to have an in-house research capacity, and this is represented by the Joint Research Centre. The assumption from that is that therefore research done elsewhere cannot be guaranteed to be independent. Would you like to comment on that?

A. Yes, my Lord Chairman, there is a proportion of its work, although this is a minority, which is carried out directly for the Commission to support it in its policy and regulatory functions, and in many countries, although not under current policy here, it is considered legitimate for a Government or a ministry to have a laboratory which is able to provide independent advice. Indeed, many people in industry support that concept. They do not want potential competitors developing regulations and standards that affect them, for example. In those capacities therefore I believe that the Commission does have a legitimate argument. Those arguments do not apply though to the majority of its work which is taken out of the Framework Programme budget.

118. But you are from an academic base, so would you not in all honesty say that a university department, for example, provides the same degree of independence if required?

A. Yes, my Lord Chairman, certainly for many types of research that would be the case and competitive bidding for this work would soon establish that. There are, however, some longer term monitoring duties—maintenance of databases and infrastructural activities—which are probably best carried out in public sector laboratories.

Lord Gregson

119. Are they truly research?

A. No, they are science rather than research, that would be the best way to describe them.

120. Have any of your members ever visited these centres and formed an opinion on their activities?

A. I do not feel that I can go much further on this, my Lord Chairman, as I have not been part of the evaluation of the Joint Research Centre.

121. The United Kingdom was one of the few countries that had the government research establishments compared with the rest of Europe. Look what has happened to them, and they have been exposed to competition.

A. In virtually every country which has government research establishments there has been reform, not necessarily as far as privatisation, but at a minimum commercialisation involving competition.

122. Is it not time that these organisations should be looked at in the same light?

A. Yes, certainly, and that was the thrust of my earlier comments.

Lord Phillips of Ellesmere

123. For example, my Lord Chairman, there is a programme in the Joint Research Centre I understand which is concerned with developing means of avoiding the use of animals in experiments of various kinds. How was it decided that that was a Joint Research Centre activity rather than something that could be put out to tender?

A. I am afraid that I do not know about that specific activity.

Chairman] We will ask the Director General.

Lord Craig of Radley

124. My Lord Chairman, in a point made by the Joint Research Centre in their own publicity the multinational core of scientists are joined every year by a significant proportion of scientific guests who are hosted by the Joint Research Centre in the interests of promoting mobility and the transfer of ideas. Do you have any views about that as to whether it is a valuable aspect of the Joint Research Centre's existence?

A. I think that that statement would be true of almost any larger laboratory or scientific facility.

125. So it does not add up to a row of beans?

A. The relative benefits of these people visiting the Joint Research Centre as opposed to other authorities—well, no, it is something that should be evaluated specifically.

Chairman

126. Now I wonder whether I may revert back to the bureaucracy that we referred to earlier and which I said we ought perhaps to revisit. You were referring to scientific assessment and I think that you made the point that while that continues it has been by a process of accretion that a number of other bureaucratic interventions have been made. You referred, I think, to inter-service consultancy, by which I think that you meant the consultation between Directorates General?

A. Yes, my Lord Chairman.

127. Now one of the points that we have had in evidence to us is that the Directors General operate to quite different processes. The paperwork is quite different in one Directorate General to another. Would you like to comment on that?

A. I am afraid that my experience is of a fairly narrow range. There are certainly differences within that range, but they are fairly used to working together.

128. As everyone, and you particularly, has stressed the immense bureaucracy do you have any

Chairman *contd.*]

practical proposals that you would like to put to us as to what we should put in our report to reduce the bureaucracy and streamline matters?

A. My Lord Chairman, to use some jargon, I think that it is probably time for some business process engineering within the Commission and it is time to think what we really want them to do, and if we want them to be able to produce a contract within a month, it is up to them to design a process which is capable of doing that. There should be a much more user friendly attitude to their activities. Such changes would involve fairly root and branch reform, not having another working party to examine contracts.

129. So in other words you would start with some performance targets and work back from there, is that right?

A. Yes.

130. That is how you would set about it?

A. Yes.

131. Which would clearly mean that existing procedures would be totally impossible. You would have to change everything root and branch, would you not?

A. Yes, I believe that that would be the case.

132. There is within Europe a great requirement for accountability and advisory structures. Would you like to comment on the effective roles of CREST, IRDAC and ESTA, and whether they fulfil a useful role or whether they in any sense complicate the process?

A. My Lord Chairman, CREST is clearly necessary: there needs to be an interface with the policies of the Member States and a degree of co-ordination, although the benefits of that can also be overstated. On the Biotechnology panel we have heard the view that IRDAC is too high level and general in its approach and that it fails to address the views of certain categories of industry, three in particular: we have heard that it does not get across the views of user companies, those which might make use of the results but are not direct participants, secondly, of SMEs once more and thirdly, of middle management within companies, the type of people who would be making specific decisions about whether to participate in the Framework or not. So I am merely reporting evidence, but this did come from a number of countries. On the third one, ESTA, this is relatively new and we would feel that it is too early to comment on how effective it is.

133. If we may go back to your thesis that some sound business principles would cut the Gordian knot and get processes speeded up, is not one way of doing that to reduce the number of applications? You have got at the moment something over nine-tenths of the applications for grants being turned down, and presumably that generates a lot of unnecessary paperwork?

A. Yes, that is certainly the case, my Lord Chairman. It is always difficult to reduce applications. Some of the measures which are occasionally proposed have the opposite effect, for example, having a two stage application process which allows an outline proposal to be put in simply encourages people to float in several even if they are not capable of performing all of them just to see which one is likely to succeed. Probably the only reasonable way to reduce applications, short of rationing in some form, is to narrow the range of the programme. However, again we have heard evidence in our evaluation that people do generally think that programmes over-specify. There seems to be a desire for two things at the same time, a narrower range and a clearer process to allow concentration of resources, but within that allowing the scientific community to be more creative in how it responds to those targets and not to have a detailed work plan.

134. To be fair to the Commission is it not the case that on each successive Framework Programme the Commission has started with a narrower range of programmes to be funded under the European Framework than the Council of Ministers have ultimately determined, in other words, each Member State tries to play its own strengths?

A. Yes, my Lord Chairman, that is certainly the case, and that goes back to the first point that I made, that these programmes tend to grow by accretion and there are lobbies which are there to support particular activities. They lobby hard to get them in and once they are in it is very hard to get them out so we do get this spread of activities which in turn encourages over-subscription.

135. Going back to trying to reduce the number of applications which take up so much time, and given that one way would be to have a better focus, nevertheless, having got a better focus with the agreement of Member States, would pre-screening have a role?

A. Who . . .

136. Who is going to pre-screen, you were going to ask?

A. Who would pre-screen was my question, yes.

137. I assume that an offshoot of CREST or somebody will have to do it?

A. Yes. The problem with those types of solutions is that if anything they add to the bureaucracy because they add an extra element of time and effort needed to do the pre-screening.

Chairman] Someone eventually has got to make the decision. All that I am suggesting is that you have a fast track to reduce the chaff.

Lord Haskel

138. My Lord Chairman, I was just going to comment that most of the outcomes of business process engineering are that people lower down the hierarchy get to make the decisions. Would you suggest that this is a way of speeding up?

A. Yes, I believe that some devolution within the Commission would allow them to function more effectively. There are often very highly qualified scientific officers who none the less do not have the ability to manage their areas to the degree that we now expect in our own research councils, and certainly far less than their equivalents in the United States of America.

Lord Craig of Radley

139. One of the accretions that we see in the European Union, of course, is an increase in the number of Member States and I wondered whether in your view that has had any impact, or is likely to have any impact, on the difficulties of arriving at a restricted number of likely areas for research?

A. I can only think that it has the potential to make things more difficult. On the positive side the most recent new members come from countries which do have traditions of good government and are helping to press for some of these reforms.

140. And good research backing too?

A. Yes.

Lord Porter of Luddenham

141. My Lord Chairman, I was just wondering, in assessing this huge number of applications what emphasis is given to the country and what emphasis is given to the scientific quality? I am sure that both are taken into account. How do you divide between the two, how is the assessment made between the two?

A. Those who are carrying out the scientific evaluation will only look at the quality of the proposal and, either at the same time or separately depending upon the particular process, the ability of the proposers to do that work, their reputation and so on. Hence, in that part of the process I do not believe that there is any bias according to the nationality of the participants. The bias could take place before or after that. First of all applicants may themselves rightly or wrongly believe that they need to have partners from particular countries and therefore build them into projects even where they are not strictly necessary. As researchers we do occasionally get unofficial messages or hear that a talk has been given by a Commission official in southern Europe saying, "Don't have a British lead partner because there are going to be too many British successful projects in this particular scheme, so make sure that one of you is presented as the lead partner". This kind of thing goes on. All of this is before any proposals are assessed. At the other end of the process in some areas where they have the power to do so programme committees can intervene, perhaps make changes where there are marginal projects and they would argue all other things being equal cohesion should be given weight in the selection of projects, so that would be one way. Another way would be asking you to take on additional partners within the project. That is probably the worst case.

142. Is there any sort of overall guide as to the distribution between the participating countries and how it should come out in the end?

A. No, the Commission strongly resists the idea that it should be distributed on that kind of basis and, indeed, is very reluctant to issue any statistics about the return to each country. However, every official delegate is carefully counting that, including our own, and they consider it to be one of their main performance indicators.

Chairman] Professor Georghiou, we are most grateful to you for the patient way in which you have answered our questions and helped us from your very specific knowledge of the Framework Programme. Thank you very much for the help that you have given us.

Memorandum by the Confederation of British Industry (CBI)

Please find attached two papers prepared during this year, which present the CBI policy on European funding of RTD for consideration by the House of Lords Science and Technology Committee for consideration during the inquiry into the European Framework Programmes.

The first paper—*"The role of the European Commission in funding RTD: Preparing for the Fifth Framework Programme"*—addresses the basic principles under which the European Commission should fund research. It looks at the needs of industry, the operation and experience of the Fourth Framework Programme and provides the CBI's early view of the Fifth.

The second paper—*"Structure, Management and Consultation in Support of RTD: Preparing for the Fifth Framework Programme"*—was published in response to the Commission's *"Preliminary guidelines"* published in July 1996. The second CBI paper provides more detail on the structure, management and consultation by the European Commission in the next Framework programme. We firmly believe that the most important aspect of the Fifth Framework Programme is the need for an embedded process of consultation with European industry and flexibility in the detailed contents of the specific programmes themselves. This latter point is essential if the Fifth Framework Programme is to be able to evolve as technologies develop in the future—the Fifth Framework Programme will be running between 1999 and 2004, by which time many technologies will have moved on and new areas emerged.

The second paper was completed at the end of September 1996 and both have been circulated to the UK Government and the European Commission. I believe these two papers fully answer the questions raised in the Committee's call for evidence, but should you require further information please do not hesitate to contact me.

Dr Philip Wright
Technology Group
23 October 1996

THE ROLE OF THE EUROPEAN COMMISSION IN FUNDING RTD: PREPARING FOR THE FIFTH FRAMEWORK PROGRAMME

SUMMARY

The needs of industry

- The construction of the next Framework Programme must be used to review all aspects of support for research and technological development (RTD) at the European level.
- The prime objective of European RTD must be to enhance the competitiveness of European industry and commerce.

The Fourth Framework Programme

- The change of orientation in FPIV towards an output driven approach was welcomed by the CBI.
- The annual review of FPIV must allow programmes to evolve to meet changing socio-economic needs.
- Within the UK there must be a review and rationalisation of centres of information and assistance on European RTD.
- SMEs must be provided with simplified access and financial support for preparation of proposals.
- The CBI welcomes the role of the Task Forces as long as:
  - they play the significant role in coordinating European RTD with national programmes;
  - they operate openly and, in future, themes are identified following full consultation with industry;
  - they do not allocate funds, but inform cross-programme collaboration with an applied or strategic focus.

The Fifth Framework Programme

- The key objective must continue to be the enhancement of European competitiveness as both globalisation of technology and its speed of change accelerates.
- The Commission and industry should cooperate fully in the development and operation of FPV.
- The scale of FPV should be concomitant with the size of the task; that is focused on perceived needs not on spend targets.
- The dogmatic stance on pre-competitiveness should be revised.
- The balance of research should favour strategic and applied research, although basic research should be considered where there are clear industrial or socio-economic benefits at the pan-European level.
- The academic community must be encouraged to sustain a long-term perspective, however, “blue skies” research is best left to the academic community funded by Member States and not considered in FPV.
- Resources should be concentrated on areas which add value through coordination across Europe.
- Although some progress has been made, significant further effort must be put into reducing bureaucracy.
- The primary function of the Task Forces should be to play a key coordinating role between programmes.
- The efficacy of two-stage proposals should be reviewed since, despite their theoretical benefits, practical realities can mean little or no saving of effort is made over single stage proposals.
- National initiatives such as the UK’s Technology Foresight programme should be taken into account when planning the content of the specific programmes.
- The role of FPV in educating and training individuals for industry and commerce must continue: the development of a European Teaching Company Scheme should be considered.
- The role of the JRC must be reviewed and increasingly exposed to market forces through competitive tendering.

Concluding remarks

- The role of the Commission in supporting RTD across member countries should not attempt to duplicate effort at the national level, but provide a coherent framework for collaboration.

February 1996

The Role of the European Commission in Funding Research and Technological Development: A CBI Position Paper

The needs of industry

1. The overall goals of the current Framework Programme are:

    i. to enhance the competitiveness of European industry;

    ii. to improve the quality of life for European citizens;

    iii. to support European Commission (EC) policies.

2. All discussion on the shape and development of future European research and technological development (RTD) programmes must recognise that:

- RTD is only one, albeit essential, input to innovation and competitiveness;
- the evolution of technology and changes in industry are occurring at an accelerating pace throughout the world;
- companies operate in a global market;
- RTD policies have an essential role to play in developing and training the skilled workers which sustain European companies.

3. The CBI supports the timely publication of the Commission's Green paper on Innovation. Stimulating discussion on the wider issue of innovation will provide a positive backdrop against which the Fifth Framework Programme (FPV) can be developed.

4. The need to strengthen the industrial competitiveness of Europe is today stronger than ever. In the activities of advanced technology the European Union (EU) had a trade surplus until 1983. In 1992 however, the EU's trade deficit stood at $18 billion, whereas the USA and Japan had a combined surplus of $95 billion. Among the many causes of this situation, the relative levels of investment are one of the most salient. The gross internal product invested in research is presently only 2 per cent in the EU compared to 2.7 per cent in the USA and 2.8 per cent in Japan.

5. The CBI believes there are clear benefits for UK companies arising from research collaborations with European companies, contract research organisations (CROs) and universities.

6. If the competitiveness of Europe is to be improved then the RTD programmes established and coordinated by the Commission should provide:

- support for the strengths of European industry;
- fair and open access to the results of research in the European scientific community whenever the intellectual property arising from them is not an issue for the partners involved;
- support and encouragement of innovative companies and individuals and;
- an appropriate regulatory framework which enables innovation from scientific and technological advancement.

7. To fulfill these objectives there must be wide consultation with industry on the content, mechanisms, implementation and outputs from the Framework Programmes. The current consultation mechanisms are not widely understood by most companies, due in part to the disparity of consultation systems between directorates and consequently their efficacy is difficult to judge.

8. We believe the current debate on the next Framework Programme—the Fifth—must be seized as a clear opportunity for the Commission to thoroughly review all aspects of research at the European level.

Operation and experience of the Fourth Framework Programme

9. The Fourth Framework Programme (FPIV) is still in its early days. However, the CBI believes there is a need to identify mechanisms to accelerate the appraisal of Framework programmes to inform direction and content in the future. The CBI welcomes the annual review of FPIV, first published during October 1995, which should allow problems to be identified earlier and Programmes to evolve as necessary. However, the CBI believes the annual review could be developed further by identifying strengths and weaknesses in the current programme more clearly, taking account of rapid changes in research and technological development.

10. Under FPIV, there was a concerted change of orientation towards an output driven approach, which was welcomed by the CBI. The focus on application and exploitation of results must continue to be extended across all programmes and a key element in evaluation of project proposals, monitoring during project execution and auditing upon project completion.

11. The structure and organisation of the FPIV programmes is often confusing to companies, particularly SMEs, and ease of access to programmes and independent, credible advice is essential. From the UK's perspective, the Business Links must be the key access point and the work of the DTI in coordinating and disseminating support information must continue. Centres addressing European RTD must be rationalised; for example it is hard to understand the relationship between the Innovation Relay Centres, Euro Info Centres and Business Innovation Centres. This dispersed activity creates confusion and does not lead to an effective critical mass. The Department of Trade and Industry has to take a more proactive approach in coordinating the process to involve companies in European RTD.

12. The principle of the CRAFT programme has been a positive development in the FPIV programme. The assistance for SMEs developing proposals is welcome because of the disproportionate cost, both financially and in resources. However its efficiency has been reduced through dilution of expertise across the directorates and further strengthening of its administration must be considered. In particular consideration should be given to a establishing a clear, single point of contact for SMEs under CRAFT, via which appropriate programmes could be identified.

13. Additionally, under FPIV, certain CRAFT programmes did not allow participation of larger firms. Such a restriction can be counter productive as a larger partner can assist SMEs and provide additional resources for a project and, when considering programmes which directly impact upon supply chain relationships, such an exclusion is illogical. The critical roles of CRAFT must be to provide a simplified mechanism of access and financial support for SMEs to develop partnerships and proposals.

Emergence of the Task Forces

14. The thematic Task Forces were announced earlier this year by the Commissioner for research and technological development (RTD), Madame Edith Cresson; the main reason for their development being the need to "coordinate research in Europe".

15. The CBI understands the objectives of the Task Forces to be:

- to define research priorities in consultation with industry;
- to provide better coordination of projects within FPIV and;
- to consider further cooperaton between undertakings and possible supplementary programmes.

16. Whilst the CBI welcomes the Task Forces' objectives, they should not be used to drive research across Europe more centrally, but used to identify areas of cooperation. Such cooperation need not require funding from the European RTD programmes, but could indicate where Member States would benefit by collaborating on a bi- or multilateral basis. Coordination should reduce duplication of effort and assist with the identification of research programmes which can be more effectively addressed at the European level. Under no circumstances should the Task Forces, or any other mechanism in the Commission be used to direct national programmes of research.

17. The CBI believes the Task Forces should not become directly involved in allocating funds or managing projects under the Framework Programmes. They should however, provide recommendations and fulfil a steering role for cross-programme issues with an applied or strategic focus. If absolutely necessary, new programmes should be established under the current framework structure. Allowing the Task Forces to allocate money in their own specific programmes will cause greater confusion and potentially lead to further levels of bureaucracy being created.

18. Overall, the CBI sees the establishment of the Task Forces as a positive move if a number of safeguards are put in place. In particular, if the Task Forces are to be successful they must operate openly and the themes should only be identified following full consultation with industry.

The Fifth Framework Programme

19. The key objective of European research and technological development (RTD) programmes must continue to be the improvement of the industrial competitive position of the European Union. Achievement of this goal is likely to have the greatest overall beneficial impact and will contribute significantly to improving the quality of life at the European Union (EU), national regional and personal levels.

20. The CBI urges that as the basic rationale for FPV is concerned, the prime consideration must be the needs of industrial and other users of research. It may be that it will represent an evolution from FPIV however, the Commission should not shy away from a more radical change in its operation. Indeed the need for such a revolution may become more pronounced in the light of both the Annual Review and the operation of the Task Forces.

21. A greater ethos of partnership between the Commission and industry should be fostered in which the views and needs of industry are expressed through representative and sectoral bodies at the national and European levels, as well as by individual companies. The Commission should cooperate more with industry in the formulation of strategy and programme content by open consensus approaches. In line with this, mechanisms for consultation should be made clearer and more open. Where effective mechanisms exist—for example the industry panels in ESPRIT—they should be further empowered. There is a role for the Commission in stimulating contact across sectors to allow identification of common technological needs.

22. FPV must be flexible in its approach to changing technological and societal needs and opportunities. The length of time it takes to develop each consecutive Framework Programme is excessive—for instance FPV will not be up and running before 1999. Such flexibility must be considered against clear strategic objectives and the publication of the Annual Review initiated under FPIV. The Institute of Strategic Studies should play a role in identifying rapidly emerging or novel technologies.

23. The budget of the current Framework Programme represents about four per cent of the total spend on civil and industrially-oriented RTD activities within the EU and between three and four per cent of the total budget of the Commission. This level of expenditure should be sustained in FPV as long as it can be justified by the objectives and added value provided by funding RTD at a pan-European level. The scale of FPV should be concomitant with the size of the task.

24. Consideration should be given to increasing the number of technology demonstration activities to stimulate the pull-through of research to new products and processes. If there is to be any increase in the budget allocated for RTD during FPV, this should be considered a priority. As for other aspects of the Framework Programme, the focus of such activity must be industrial relevance and developed on the basis of providing added value across the Union.

25. The Commission should use the funds of FPV strategically, that is towards targeted goals or objectives of industrial value following consultation with the users of research. Whilst taking all possible steps to avoid falling into the trap of "picking winners" in terms of future technologies and products, the next Framework Programme should seek to play to Europe's strengths and support the interests of the major European industrial sectors which compete on a global basis.

26. The Commission's current stance on pre-competitive research is confusing as its definition can be open to misinterpretation. On the one hand, the Commission is striving to ensure that the research that it funds does not get too near to the market place yet is sensitive to the need to demonstrate to the Parliament and Council that its funds are having a measurable impact upon industrial competitiveness. A more coherent position towards pre-competitiveness must be adopted. The majority of research funded by the Commission should have a clear scope for industrial or commercial exploitation on a timescale of 1-10 years from the completition of the EU funded project. Some research may require a longer term perspective such as technologies which could not be funded by a single country, but potential relevance to industry must be considered as the key qualifying criteria.

27. The CBI considers the Commission's focus on generic research to be laudable however, in a move towards more objective-driven and thematic research, there must be a revision in the interpretation of not only pre-competitive research, but also generic research in recognition of the need to move towards a more application or sector-oriented approach.

28. The balance between basic, strategic and applied research across the whole of the Programme should favour more objective driven strategic and applied research. Basic research should only be supported where there are clear industrial and socio-economic benefits across Europe. "Blue Skies" research is best left to the academic community funded by the Member States and should not be considered in FPV other than the TMR (Training and Mobility of Researchers) programme where the main emphasis is the provision of training and professional development.

29. As the European industrial RTD needs are so significant and financial resources limited, coordination between national and EU programmes is essential. FPV should be required to relate more closely to national programmes and vice-versa. Efforts should be concentrated on areas which provide real added value by coordination across Europe and should not compete with programmes, technologies or infrastructure best suited to national or regional management.

30. Individual specific programmes must not be overly prescriptive and become more responsive to ideas that fall between two or more programme areas in order that technology transfer and technology fusion opportunities are not lost. Better mechanisms to positively manage such proposals must be put in place by the Commission. The Inter-programme Coordinating Groups should be enhanced and given the challenge of developing more effective mechanisms for ensuring the promotion, efficient evaluation and funding of innovative proposals that otherwise might not find a satisfactory "target" programme.

31. The management of the current Framework Programme is still perceived to be cumbersome and overly bureaucratic. The Commission's attempts to simplify and make its processes more transparent are recognised but further measures are necessary. The apparent complexity and mystery of the programmes could be overcome through the provision of more explanatory material ("how to" type guidelines) and improved

dissemination to companies, especially at the national level. The comments on the rationalisation of national centres in paragraph 11 should also be taken into account during the development of FPV.

32. Whilst waiting times have shortened during proposal evaluation, the contract negotiation phase must be further improved. Although lean, efficient administration is clearly a desirable objective, the Commission should review the level of its human resources which implement the programmes. Commission resources should be deployed more efficiently. To achieve this, professional external project management should be used to assist Commission staff with their present role of monitoring current projects and expediting their dissemination and exploitation.

The future role of the Task Forces

33. The emergence of the Task Force approach has already been given a qualified welcome in this paper and we believe they should have a strong role in FPV providing our concerns expressed earlier are addressed. Beyond this approach, there would be merit in strengthening the development of thematic networks and the clustering of projects. Industry-led networks should be encouraged to stimulate research proposals and with advising the Commission about future research needs as well as acting as dissemination and information groups for current EU (and Member State) research activities. Thematic networks, the need for which could be informed by the Task Forces, should act as bridges for areas of research that are relevant to two or more programmes.

34. The Commission must strive harder to achieve "pull-through" of its funded research using the mechanisms of its own exploitation programmes and the Task Forces must maintain this as a key focus of their work.

SMEs

35. The European Commission has, quite rightly, placed great emphasis on the needs of SMEs. Much of the future competitiveness of Europe will depend upon the success and growth of companies from this sector. However owing to their size and limited resources they have particular needs which the Commission has already begun to address.

36. Perhaps of greatest importance to SMEs are the benefits of participation in the Framework Programmes, especially access to expertise they cannot sustain in-house. However for it to be cost effective, and indeed attractive for them to participate three key issues need to be addressed:

— ease of access to the appropriate research programme;
— assistance with developing the collaborative partnerships and preparing applications;
— and a shorter-term return which will enhance their competitiveness.

37. The present Framework Programme offers the special measure of Exploratory Awards and the CRAFT scheme across many of its specific programmes to stimulate the involvement of SMEs in research at the European level. Whilst the availability of imaginative measures to draw SMEs into collaborative research can only be welcomed, there should be a rigorous review of the effectiveness of the current special measures prior to any further expansion in FPV, focusing on any benefits.

38. The case for the wider use of two-stage applications is unclear, although the objective of reducing both the cost of proposal preparation and the potential waste of effort on the part of applicants should be pursued. Although the pre-proposal concept in the ESPRIT programme has been successful, many companies suggest that in other programmes a full proposal often has to be finalised and a précis subsequently prepared for the initial application. Consequently no saving in time or money is made.

39. The effectiveness of two-stage proposals should be closely monitored before its wider implementation in the next Framework Programme. If the two-stage proposal mechanism is extended to other programmes the evaluation criteria for outline proposals should focus upon the technical, environmental, economic and social impact, in addition to the excellence of the research.

40. The Commission should consider the provision of EU funds to make EUREKA accessible to SMEs for whom national funding is not available, where it aligns with EU objectives. In addition the use of demonstration projects should be extended to the industrial, materials and information technologies programme areas as these can be effective mechanisms to introduce new technologies to smaller companies.

The UK's Technology Foresight Programme

41. The Commission needs to ensure that the lessons learnt and the output from the UK Technology Foresight Programme are taken into account when formulating the individual specific programmes of FPV. Whether a European Technology Foresight exercise is needed or not is debatable, but it would be inexcusable if cognisance was not taken of the output of programmes by EU national governments, such as Technology

Foresight. If the Commission is to undertake a Foresight or other consultation exercise, it must adopt the approach of the UK exercise with a partnership between industry and academe and focus on potential market application.

The role of universities

42. Given that the aims of the Framework Programme are primarily the enhancement of European industrial competitiveness, the participation of universities should be carefully aligned with this objective.

43. One of the key roles of universities is the provision of well educated and research-trained graduate and post-graduate students to industry and commerce. The close cooperation of companies and universities fostered by EU (and national) programmes serves well to expose young researchers to the world of industrial research. The level of training-oriented activities in the current Framework Programme should be sustained in FPV. However, current Framework Programmes (most notably the TMR Programme) tend to focus on the placement of students in other academic institutions and there needs to be a concerted effort to encourage industry to become more actively engaged as recipients of students and researchers. The placement of post graduate researchers in companies should be used as a mechanism for transferring ideas and technology from the academic to industrial sectors as in the UK's Teaching Company Scheme.

Joint Research Centre

44. The principal role of the Joint Research Centre (JRC) is to perform RTD in support of EU policy issues. However, this work must be put out to competitive tender and the JRC exposed to market pressures to ensure efficient use of resources.

CONCLUDING REMARKS

45 The CBI firmly believes there is a clear and distinct role for the European Commission in supporting RTD across member countries. Such a role should not attempt to duplicate effort at the national level, but create synergy and a coherent Framework for collaboration between companies and universities.

46 Finally, it must be acknowledged that the RTD Framework Programmes are effective in achieving cohesion, not just between developed and lesser developed areas of the Union, but also, and perhaps critically, within and between industrial sectors and companies, between industry and academia and across scientific disciplines.

February 1996

STRUCTURE, MANAGEMENT AND CONSULTATION BY THE EUROPEAN COMMISSION IN SUPPORT OF RTD: PREPARING FOR THE FIFTH FRAMEWORK PROGRAMME

SUMMARY

Introduction

- Europe must continue to invest and capitalise on its scientific, engineering and technological capabilities.
- Full cognisance must be given to the links between the Fifth Framework Programme and the business environment which can either encourage innovation or constrain it.
- European Commission RTD programmes must:

  promote and support the strengths of European industry;

  provide fair access to the results of research, sympathetic to the intellectual property rights of contributing partners;

  support and encourage innovation;

  and operate in an appropriate regulatory framework.

Structure

- The structure of the Fifth Framework Programme should be broken down into two areas:

  a limited number of themed programmes (probably six);

  and support for knowledge infrastructure.
- Exploitation routes should not be considered as a separate activity, but integrated into each specific programme and individual projects.

— The themed programmes must be drawn up through the on-going consultation on the Fifth Framework Programme.

— The specific content of each themed programme should be decided through an embedded process of consultation.

— Support for knowledge infrastructure should include four activities:

technologies for the future;

Training & Mobility of Researchers;

technology foresight/forecasting;

and technology demonstrator facilities.

— Actions under the TMR banner must be improved, in particular orienting it to encourage participation by industry and alignment with the objectives of the themed programmes.

— The Commission must not develop a supra-national foresight exercise, but take account of national initiatives.

Consultation

— The development of objectives under the Fifth Framework Programme must be as open as possible and driven by industrial and societal needs.

— The Task Forces should evolve and be integrated with the Management Committees of the specific themed programmes.

— The new Task Forces would comprise of representatives from industry, academe and the Commission and be charged with:

identifying research objectives through consultation;

reviewing and monitoring implementation of the programmes;

and providing recommendations as to emerging needs.

— The new Task Forces should act as a "board" for each themed programme and should be chaired by a representative from industry.

— Research objectives must be selected following wide consultation and according to the following criteria:

importance in underpinning European competitiveness;

high added value by co-ordinating at the European level;

support development of necessary regulations and standards across Europe;

and significant return on the investment.

— International co-operation should be identified where appropriate by the Task Forces and provide complimentary access to research programmes.

Management

— The prime management of the Fifth Framework Programme should be arranged through a limited number of "units" aligned with the programme themes.

— Clear time targets must be set for the handling, review and initiation of projects by the Commission to improve administration.

— Proposals should be judged against published generic (overall objectives) and specific (research objectives) criteria.

— There is a need to rationalise information sources and "points of access" for companies, especially SMEs—these must be sympathetic to national initiatives.

— The CRAFT action should continue but provide a simplified, single, access route for SMEs into the themed programmes—there should not be an action separated from the full programme.

September 1996

STRUCTURE, MANAGEMENT AND CONSULTATION BY THE EUROPEAN COMMISSION IN SUPPORT OF RTD: PREPARING FOR THE FIFTH FRAMEWORK PROGRAMME

Introduction

1. Increasingly the science, engineering and technological capabilities of nations will determine their future relative competitiveness. Against this the European Framework Programmes for research and technological development (RTD) must take increasing importance as both the constraints on spending become more pronounced and the pace of technological change accelerates.

2. The European Commission's Green Paper on Innovation illustrated the range of competitive pressures facing businesses and the importance of sustained innovation. It is into this wider context that the European Framework Programme for RTD must fit. If Europe is to compete successfully it must continue to invest and capitalise on its scientific, engineering and technological capabilities.

3. In an earlier paper[1], published in February 1996, the CBI developed a number of basic principles for the Fifth Framework Programme, especially to align it with the needs of industry. Whilst these must not exclude social aspects of the European Community, if the competitiveness of industry falls, it will be impossible to sustain expenditure in support of social needs at the current level.

4. However, the Framework Programmes cannot enhance the performance of European industry in isolation. As highlighted in the Green Paper on Innovation, it requires a supporting regulatory and financial regime. The CBI therefore urges that full cognisance is given to the links between the Fifth Framework Programme and the business environment which can either encourage innovation or constrain it.

5. The CBI has already stated and continues to promote the view that if the competitiveness of Europe is to be improved the RTD programmes should:

- promote and support the strengths of European industry;
- provide fair and open access to the results of research in the European scientific community whenever the intellectual property arising from them is not an issue for the partners involved;
- support and encourage innovative companies and individuals;
- and operate in an appropriate regulatory framework which enables innovation from scientific and technological advancement.

6. This paper provides recommendations as to the structure, consultation and management of the Fifth Framework Programme and builds upon CBI's earlier comments outlining the basic principles under which the European Commission should fund and support RTD activities.

Structure

7. The CBI firmly believes that the structure of the Fifth Framework Programme should reflect the need to focus the spending in support of innovation and the need to retain flexibility. It should therefore be arranged into a limited number of specific themed programmes. Creating a large number will inevitably lead to loss of focus and the danger of spreading funding in support of RTD too thinly.

8. There are a number of approaches which could be adopted to fund European RTD, the most common promoted from a variety of sources are aligned with either generic technologies, industrial or societal needs ("themed" approach) or a "matrix" approach combining the two. Although the matrix approach provides a logical structure to identify specific areas for funding, it is also likely to lead to the development of the largest number of sub-programmes and lead to difficulties in management.

9. The CBI therefore believes the programme should be broken down into two areas:

(i) a limited number of themed programmes and;

(ii) support for the knowledge infrastructure (education and training and support for technologies).

The area supporting the knowledge infrastructure in the European Union would provide a mechanism to which good proposals and ideas whch do not necessarily fit in the themed programmes could be submitted. This would provide flexibility and remove a criticism that some projects suitable for European support do not "fall through the cracks" between programmes.

10. The commitment of resources between the two should be approximately 80:20 between the themed programmes and knowledge infrastructure and the overall funding, as previously stated in the CBI's earlier submission, held steady after allowing for inflation at around 12 billion Ecus.

11. The CBI does not believe that either the co-operation with countries outside the European Union—"international co-operation"—and exploitation should be established under a separate activity, but that these should be embedded into the actual Framework Programmes. International Co-operation should be identified according to the needs of the various specific programmes.

---

[1] "The role of the European Commission in funding RTD: preparing for the Fifth Framework Programme". CBI, February 1996.

12. Exploitation routes should also be considered under each specific programme and consideration given by the individual projects themselves. Any potential outcome of the research should not be seen as a separate issue from the funded projects.

Themed Programmes

13. The CBI recommends that there should be a limited number of specific programmes in the Fifth Framework Programme—probably six—each representing a cluster of RTD themes. The CBI has identified six examples as follows:

(i) Information and communications technologies.
(ii) Health and life sciences.
(iii) Manufacturing technologies and European enterprises—creating companies of the future.
(iv) Environmental sustainability.
(v) Energy for the future.
(vi) Transportation and mobility across Europe.

14. This list should not be viewed as definitive and the specific themes should be defined by the wider consultation on the Fifth Framework Programme and other mechanisms. The determination of the specific content of each themed programme—which should be restricted—should then be decided through an embedded process of consultation and the technology foresight activities in various Member States.

Knowledge infrastructure

15. In order to sustain the competence required and develop the skills base across Europe the CBI recommends that a second strand of the Fifth Framework Programme should be aimed at supporting the knowledge infrastructure. This should include the development of the skills base and the resources to support the wider activities of RTD across Europe. The CBI has identified four areas for action:

(i) Technologies for the future.
(ii) Training and Mobility of Researchers.
(iii) Technology Foresight/Forecasting.
(iv) Technology Demonstrator Facilities.

Training and Mobility of Researchers

16. There is a need to ensure that technologies—including new and developing technologies—continue to be supported while the Framework Programme is oriented towards a themed approach. Whilst this should not be used as a back door mechanism to support too wide a range of research leading to loss of focus, the Commission can provide a role in coordinating networks for academics and industrialists across Europe. TMR should be seen as a key mechanism to deliver this.

17. However, there must also be clear steps to improve the actions under the banner of the TMR. This especially applies to orienting TMR so that industry is able to participate more readily. Whilst they are not specifically excluded its participation is minimal.

18. Mobility of researchers should be encouraged between industry and academe and between companies. The CBI recommends, as in our previous statement, that the Commission should look to the United Kingdom's Teaching Company Scheme as one model to achieve this.

19. Whilst viewed as a successful activity under previous Framework Programmes, greater alignment with wider research objectives should be seriously considered. The TMR programme must be complimentary to the themed programmes delivering the specific research objectives.

Technology Foresight/Forecasting

20. In the Green Paper on Innovation and from many representative bodies, technology forecasting—or Foresight—has been cited as a key area of activity for the Commission. The CBI repeats very strongly that it sees no need for a supra-national Technology Foresight exercise organised by the Commission. However, the Commission clearly must take account of national Foresight programmes to identify areas of common interest and inform the content and research objectives of the Framework programmes.

21. With regard to who should manage the Technology Watch and Forecasting activity on behalf of the Commission, the Institute of Prospective Technological Studies in Seville has a clear role to play. However,

as with the other Institutes within the Joint Research Centre (JRC), it should be opened up to market pressures and alternative organisations allowed to bid for the work (see comments below).

22. The Technology Forecasting activities at the European level should assist both the work of the Commission and act as a resource for those involved in consultation for the Framework Programmes.

Technology Demonstrator Facilities

23. Many industries would benefit not from participation in research programmes, but in access to Technology Demonstrator Facilities. Uptake of technologies by companies, especially relating to improving processes, is the most difficult step in exploiting a new technology.

24. There are already a number of demonstrator facilities located in Member States—for example in the United Kingdom the Defence Research Agency operates a number such as for Smart Materials, as part of their promotion of "dual-use technologies". The Commission could look to two actions: first networking of facilities that already exist and , where added benefit can be demonstrated across the European Community, assist in the establishment of demonstrator facilities.

CONSULTATION

25. The CBI believes that the development of objectives and modalities for the Framework Programmes should be as open as possible and driven by industrial and societal needs. The innovative use of "Task Forces" by the Commission to co-ordinate and focus research towards specific objectives is to be welcomed. However, the CBI believes that these should evolve with the Fifth Framework Programme.

26. If the main part of the programme is aligned with the themed programmes the CBI recommends that tht concept of the Task Forces is integrated with the Management Committees of the specific programmes. The actual name for the appropriate bodies is not critical and for the sake of continuity this paper will continue to refer to them as Task Forces.

Role of the Task Forces

27. The Role of the evolving Task Forces will be to act as a "board" and must be focused on:

- identification of research objectives and long-term targets;
- review and monitoring of implementation of the programmes at the strategic level;
- and recommendations as to emerging needs.

Members of the Task Force must include appropriate representation from interested parties especially industry, academe and include Commission representatives.

28. The Task Forces would be required to consult with external bodies and recognise relevant national activities of Member States such as Technology Foresight. The Technology Forecasting activity and the IPTS should assist with this.

29. In addition Member States should be encouraged to establish networks aligned with the work of the Task Forces to act as clear conduits for comments from companies and other interested parties as appropriate. These networks must, wherever appropriate, use existing nodes such as trade associations, research and technology organisations (RTOs), contract research organisations (CROs), research networks or professional institutions. However this must not exclude direct membership of the Task Forces by industry—indeed the CBI believes that the Task Forces should be chaired by a representative of industry.

Identifying research objectives

30. The CBI has stated that research should only be funded or coordinated by the European Commission where it is logical to do so—the principle of subsidiarity should be rigorously applied. The Task Forces must apply a clear and well-publicised set of criteria as to what research should be funded, coordinated or not addressed by the European Commission.

31. The criteria for selecting research objectives should include:

i. the importance in underpinning European competitiveness;

ii. the added value created by funding or coordinating research across Europe—this may include identifying pan-European issues or those areas where individual countries could not support the required research independently;

iii. support for regulations and standards across Europe;

iv. and the likely return on the investment, especially the development of a knowledge and skills base which underpins European industry.

32. Aligned with these criteria the Task Forces could recommend varying levels of action by the Commission, for example:

- research objectives under the themed programme(s);
- a focus for knowledge infrastructure actions (eg establishment of a technology demonstrator facility or a focus for fellowships under the TMR programme);
- encourage industrial sectors to establish research programmes in partnership assisting the process as necessary;
- coordination of a minority of Member States (but providing no EC funding);
- or recommend that the research is not pursued through funding by the Commission, but by Member States as appropriate.

33. The Task Forces would also monitor their respective themed programmes and if appropriate recommend changes to the research objectives or develop new ones as technologies evolve. This on-going role would build-in the necessary flexibility to meet emerging needs, although it would require clarification on how the monies were allocated throughout the lifetime of the Fifth Framework Programme.

34. Support for international cooperation could also be identified by the Task Forces according to the particular needs and fully integrated with each themed programme. Careful consideration should be given to when third party countries are invited to participate and what reciprocal benefits could be gained. Such reciprocal third party arrangements must not receive Commission funding, but provide complimentary access to their research programmes.

Management

35. The prime management of the Fifth Framework Programme should be arranged through a limited number of "units" aligned with the programme themes. The location of these management units must be up to the Commission to decide as appropriate.

36. In its earlier paper the CBI called for the improvement in the administration of the Framework Programmes. In particular there is a need to set clear targets as to the length of time it takes for the Commission to process, review and initiate funding of specific projects. This should exclude the time taken for partners to develop relationships and negotiate contracts. However partners should be encouraged to adopt the principles of "Quality Management".

37. Concern has also been expressed about the increase in the rejection rate of proposals. Whilst it is difficult to reduce this amount where open calls for proposals occur, the full publication of the criteria for selection will help and reduce the amount of misguided proposals. Criteria should be published in line both with overall objectives of the Fifth Framework Programme ("generic criteria") and in line with the focused research objectives of the themed programme ("specific criteria"). The "generic criteria" should include:

- the excellence of the research proposal (the key determinant);
- the likely impact of the research proposal on the competitiveness of Europe;
- the likelihood of exploitation by partners or dissemination for wider use within Europe.

Modes of access

38. As previously stated funding to support research should be open to all companies, research and technology organisations and academics and selection based upon excellence and alignment with specified criteria. Selection should not be based upon geographical location—actions to promote cohesiveness across the European Union are best left to regional or structural funds.

39. The CBI believes there is a need to rationalise information sources and "points of access" for companies and especially small and medium sized enterprises (SMEs). These must be provided sympathetically with provision of business information in Member States.

40. The CRAFT action, providing assistance to SMEs in participating in Framework Programmes through exploratory awards and funding for cooperative research should continue. However this must provide access to the main research programmes through a simplified point of entry.

41. As in our previous paper the CBI recommends that CRAFT and other actions must give consideration to large and small company partnerships—especially in supply chains across Europe. Excluding large companies in this context will be detrimental to SMEs who often acquire and develop technologies through their supply chain.

Concluding remarks

42. The CBI believes that the European Commission continues to have a role in supporting research and technological development towards the objective of enhancing European competitiveness. Any effort must, however, be focused on research which will provide added value by coordination at the European level.

43. If research funding is to be effective and focused towards the needs of industry and society as technology evolves rapidly, a sound mechanism of consultation is required which will facilitate flexibility. Supported by efficient management and simplified access, this will lead to a Fifth Framework Programme which will contribute to innovation and competitiveness across Europe.

September 1996.

Memoranda by SmithKline Beecham Pharmaceuticals R & D

FRAMEWORK PROGRAMME V (EU FUNDING for R & D)
SELECTIVITY, SIMPLICITY and a STRATEGIC FOCUS

SUMMARY OF PRINCIPLES

We believe that the needs of Europe's citizens, and the scientific needs of the EU's technical communities and industries, can best be addressed within a Framework Programme V that adopts three guiding principles:

Selectivity: an overt recognition that FPV cannot accommodate every feasible or attractive scientific and technological opportunity and still achieve demonstrable impact within a global context, and that a rigorous selection of priorities must therefore be made.

Simplicity: a constant and thorough attempt to simplify every aspect of FPV—its structure, organisation and administrative procedures, as a means of attracting the highest calibre participants and in order to concentrate funds and energies on the *science* of FPV-funded projects.

Strategic Focus: an acknowledgement that EU competitiveness and wealth creation will be most effectively enhanced through the support of scientific fields and industrial participation in those areas for which Europe has, or can realistically achieve, an internationally competitive capability, and the installation of procedures that protect the ability of industrial participants to exploit FPV-derived advances in a commercially viable way.

As a corollary to the third principle, we acknowledge that the science and technology that should be the predominant focus of FPV is only part of the overall programme required in the EU to address the need for greater innovation, as cogently expressed in the Green Paper recently published by the European Commission. Nevertheless, we do not believe that FPV should divert its *primary* attention and resources to address *directly:*

- social objectives
- cohesion strategy
- international relations
- regulatory environment
- patenting law
- fiscal policy
- promotion of small business policies
- pricing policies
- public perceptions of science.

The pursuit of the highest quality science within the context of competitive European industrial capabilities is, in this regard, the best guarantee of the successful generation of employment, wealth and an improved quality of life for Europe's citizens.

1. INTRODUCTION

1.1 SmithKline Beecham Pharmaceuticals (SB) considers that having the EU dimension, as well as purely national programmes available for participation is, and will continue to be, a valuable asset for R&D. SB therefore fully supports a continued EU commitment to a successor Framework Programme of broadly similar demensions to FPIV. We believe that building collaboration across European borders intrinsically adds strength and value to the science base and that additional entry criteria to satisfy "subsidiarity" and "added value" hurdles are unnecessary. In areas of interest to SB, the objectives of FPIV remain valid and are unlikely to be rendered obsolete by advances made by FPIV applicants and the international scientific community during the next few years. However, the experience to date of FPIV and previous Framework

Programmes suggests that there exists a need to change the industrial perception of the Framework Programme (at least in parts of UK industry) and to encourage the active participation of this sector as the ultimate agents through which Framework Programme objectives will be achieved.

1.2 In particular, however, the European Commission's R&D Framework Programmes remain open to the criticism that their design is far from transparent, inputs being restricted to only a subset of Europe's major science and technology players, with the ultimate users of science and technology—industry—being particularly under-represented. Programmes are currently almost mysteriously contrived by those "in the know"—and then somewhat distantly implemented by "faceless bureaucrats". SB believes that the European Commission should therefore develop a more explicit mechanism for capturing the imagination and foresight of a wider user community. This document is intended as a contribution to what should be a process of dialogue with such users.

2. The Precompetitive Requirements of Framework Programme Research

2.1 The most sensible basis for any five-year funding horizon must be a balance of fundamental research with long-term prospects for wide application, and shorter-term research designed to refine new skills and technologies in ways that test their applicability in the market-place, e.g. demonstration projects. Both will attract industrial interest and participation. However, *clearer policy is required on (pre-) competitive R&D and the timescale within which exploitation is expected, than has been evident so far in FPIV.* The Commission is rightly sensitive to the issue of demonstrating to the Union's citizens that its R&D budget is spent fruitfully. It has therefore shifted significantly away from the initial pre-competitive emphasis of FPIV, although without making the altered *de facto* requirements clear to applicants. This has introduced scope for confusion, misplaced applications for funding and misunderstood rationales for project selection.

2.2 SB feels that the need to persuade EU taxpayers of the validity of Framework Programme expenditure can be accomplished by *delineating broad but clear strategic goals in focused areas where European industry is well-placed to achieve competitive results.* The prospect of "relevance" is a necessary criterion for EU funding, but a demand for greater "immediacy" of benefit is only likely to stifle innovation. Obviously, an inappropriate shift to a market orientation also enters an area better handled by industry acting autonomously (and competitively), radically alters the company's judgement of whether this work is better tackled internally or with external partners, and complicates the involvement of companies in consortia with potential competitors and/or strict publication/dissemination requirements.

2.3 There is also a very real paradox in wishing to enhance European competitiveness while taking great pains to avoid any action that could improve the competitiveness of individual companies. Although a difficult issue, there must be a clearer realisation that successful implementation, to achieve the overall objectives of the Framework Programme, can only happen if at least one individual company picks up the work and exploits it, quite clearly with the intention of gaining an edge over its global competitors, which will sometimes include European competitors. Projects should therefore not be rejected because they have not sought to involve multiple companies with an interest in the topic.

2.4 While the promotion of "generic" technological advances can put a number of industrial participants in a better position to commercialise new opportunities through the subsequent, longer-term and competitive development of shared background, these generic advances are also likely to be published and therefore contribute as well to the capabilities of non-EU industries, and of companies that have not invested their expertise, time and funds in Framework Programme projects. Hence, there must be adequate means for participating companies to achieve a reasonable preferential return on their investment, otherwise there is no incentive to contribute. Moreover, wholly generic research without reference to either its potential applications or European strengths in corresponding industrial sectors is likely to be wasteful, and will certainly be perceived to be unfocused and diffuse by the EU's citizens and their national governments.

2.5 Finally, the reality that Europe's most competitive industries will and must have a global perspective and reach must be more overtly recognised by the Commission if it wishes to encourage the participation of non-SME companies in the Framework Programme. No globally competitive industries or companies can afford to look only to Europe, or the UK, for their technology base, nor can they sensibly restrict the benefits and location of exploitation to one part of the global economy. Global enterprises can in turn reap benefits world-wide and thereby contribute to their European bases and their associated communities.

3. General Issues

3.1 We address here the Thematic Programmes adopted in FPIV, which is a format we would favour continuing in FPV. We have put forward our views on the rather different Training and Mobility of Researchers Programme in a separate document.

3.2 SB supports a much tighter focus of Framework Programmes on the most important themes, and a recognition that the EU cannot hope to cover everything non-selectively. There should be fewer specific programmes and fewer, higher priority topics within each programme. If this leads to higher success rates and less draconian attempts by the Commission to cut the budgets of approved projects, then it will have a major beneficial impact on encouraging a wider range of participants. We acknowledge that the choice of such foci, and the attendant result that some areas will not be supported at all, will inevitably provoke prolonged and difficult debate, risking excessive delays in FPV implementation. Nevertheless, with a limited R&D budget, the EU would do well to focus on those areas where European industry is genuinely well-placed to participate and to exploit the results of Framework Programme-funded research. In short, while "picking winners", in terms of individual products and even whole technologies, is fraught with risks and uncertainties, "picking viable players" in terms of the major European industries able to compete on a global basis is both less unreliable and more productive. The demonstrable pay-back of benefits to the EU's tax-payers would thereby be more assured, and this is, in our view, a more appropriate way to benefit EU society than the pursuit, through FPV and R&D generally, of overtly societal (ie political) objectives. Given the "audience" of scientists and technologists—the people who have to put forward Framework Programme proposals—we would anyway be reluctant to see the Programmes' objectives couched in non-technological "benefit" terms, which is likely to obscure the substance of the specific programmes with a layer of rather unfocussed phraseology.

3.3 This proposed concentration of FPV resources towards viable European capabilities need not reduce to unadventurous support for existing industrial leaders or technologies, if the prioritisation "net" is cast imaginatively widely, to accommodate those technologies and markets that could be created by technology fusion, the radically expanded application of foreseeable advances into wholly new areas, etc. In part, this argues in favour of less over-specified work programmes than have been generated for FPIV.

3.4 The wish to delineate areas of EU interest, coupled with a desire to "please everyone", has led to overly detailed descriptions of work objectives in narrow areas. Not least, this can exclude the truly novel and iconoclastic proposals that the EU should be seeking as a priority. Nevertheless, we would argue against falling into the opposite trap of writing all-encompassing broad themes. This can too easily become an avoidance of choices and prioritisation. Rather, those themes/areas selected explicitly as EU priorities should be couched broadly enough to encourage new, lateral and multi-disciplinary thinking, attracting the application of approaches and techniques from one area into another and building on existing strengths without favouring the unadventurous.

3.5 Here we would indeed question a fundamental tenet of the EU Framework Programmes, namely, that applicants are required to undertake a project to match pre-defined work programmes, in contrast to more conventional "response mode" funding. The justification for this policy is unclear, but it is a potent stimulus to work programme over-specification and limited capture of the innovative capacity of the EU's scientific community (rather than those parts of it which have been able to influence the original work programme design some years earlier). Seeking internationally competitive projects within imaginatively drafted specifications for clearly prioritised specific programmes and sub-programmes may remove the distinction between EU contracted research and response-mode applications in practice.

3.6 Some of the distinctions between the current specific programmes are somewhat artificial and have led to unnecessary confusion and fragmentation of effort. Aspects of Biotech 2 and Biomed 2, for example, could usefully be combined into a cohesive Life Sciences Programme, in recognition of the fact that "biotechnology" is no longer a distinctive and separate expertise, but rather is wholly integrated with other aspects of bioscience. Similarly, the three Information Technology Programmes may benefit from not remaining distinctive entities.

3.7 In pursuit of innovation, there needs to be much stronger mechanisms for attracting and handling applications at the interface between scientific fields and between specific programmes. Thus, processes for referral of proposals from one programme to another which is more appropriate, must be installed: it is not in Europe's interests simply to reject such applications back to the consortium and to tolerate the delay in resubmitting it at the next relevant Call. Genuinely interface projects should be encouraged and explicit review mechanisms installed to avoid them being disadvantaged in comparison with proposals more simply within the remit of a single programme.

3.8 There is merit in considering having some FPV specific programmes designed initially for different periods within the 1999–2004 window. This could be particularly valuable for emerging science and technology areas where pilot and exploratory projects are required in order to prioritise a greater commitment in later years. However, this will only work if the EU can install much more rapidly responsive processes for the design, approval and initiation of new programmes or sub-programmes within the overall FPV umbrella; otherwise, leaving scope for future repositioning could become mere procrastination and lost opportunity. This is illustrated very clearly by the design of FPV, due to start in 1998 or 1999 and extending for five years, but requiring detailed negotiation in 1996; this suggests a view of the pace of scientific change that is wholly unrealistic, and risks losing major opportunities for the EU to capture competitive leads.

4. TECHNICAL PRIORITIES

4.1 We realise that the detailed scientific content of specific FPV Programmes will reflect the needs of priority areas other than those directly relevant to the pharmaceutical industry. We are in favour of wide and effective consultation across the disciplines and industries that can contribute to FPV priority objectives. Within this context, SB would highlight the following areas as candidates for focused attention within FPV.

4.2 As a high priority, SB supports the maintenance of a major commitment within FPV to human and other genome mapping and sequencing efforts (non-human species to be prioritised for their relevance to infection or as model systems for understanding human biology); methods for analysing sequences, including comparative genome analysis; bio-informatics; somatic gene therapy technologies, etc. Recombinant DNA technology is currently wholly absent or inadequate for important pathogenic bacteria, e.g. Chlamydia and Staphylococcus, respectively, and could be suitable for Framework Programme focus. Framework Programme contributions to the establishment of genome research resource centres should also be encouraged, but not in competition with pre-existing centres if they are adequate.

4.3 A key related area of interest to many European companies, including SB, and a major potential source of both health and wealth creation is the identification of function and pathophysiological significance of genes emerging in large numbers from the various sequencing projects but whose biological roles are currently unknown: such studies should also encompass experimental and predictive approaches to the structure of the gene products. Current major advances in genomics will only become fully exploitable if we develop integrative biology to build from the molecular level successively to create understanding at the cellular, tissue and whole organism levels. We would therefore favour particular attention to the control of cell growth, maturation and death; cell-cell and cell-matrix communication through both classical soluble messengers and through "solid-phase" interactions at the cell membrane; and the mechanisms of intracellular signalling, including transcriptional and post-translational controls.

4.4 The need for selectivity also applies to the disease areas that should be addressed as FPV priorities. We therefore favour the selection of a limited subset of target pathologies whose molecular and cellular mechanisms most directly exemplify the basic functional and integrative biology described in the preceding paragraph. These would include microbial invasiveness and the avoidance of host defences; common mechanisms of ageing and the associated progressive dysfunction of cells and tissues; and neural function, neurodegeneration and repair, and the immune system as prime examples of intercellular co-operation and the deleterious consequences of the loss of cellular controls.

4.5 The paucity of EU support within FPIV for medicinal chemistry, and its increasing interfacing with biology, needs to be addressed as a major element of FPV. We have addressed this issue in more detail in an accompanying document.

4.6 The application of opto-electronics, automation, roboticisation and the associated information technologies to handle high through-put, intelligent data gathering, handling and interpretation warrants more attention. This is of major interest to SB and others in the pharmaceutical industry, in terms of the generation and testing of very large numbers of novel drug candidates, of the probing of very large numbers of totally unknown human genes or gene products, of testing population-sized diagnostic programmes, etc. Other sectors of European industry will also have similar needs (environmental and food safety testing; the generation of new molecular entities to meet the huge range of applications from the chemicals industry; etc.). FPIV includes merely a single Call for Proposals under the Biotech 2 Programme in this area, and limited opportunity under the Brite-Euram III Programme.

4.7 The need to develop new capabilities in particulate science and powder technology—clearly of relevance to SB in terms of drug formulation, but also of great interest to many other chemical-based industries—should contribute towards a more imaginative linking of materials science with biomolecular science and pharmaceutics.

5. THE TASK FORCE ALTERNATIVE

5.1 The impact of the Task Force concept warrants some comment. The first batch of Task Forces targeted a set of fields that can only be described as bizarrely unbalanced: five out of eight of them were transport-related, while virtually every European transport system except the automobile remains a matter for national (usually government) ownership. The selection of areas for Task Force investigation was made in a wholly non-transparent way. More appropriately chosen Task Forces could be positive influences but could also risk becoming additional layers for project selection or programmes orientation/prioritisation, with even less transparency than the Framework Programmes, and increased susceptibility to "hi-jacking" by special interest groups. Additional complexity should also be resisted in a system that is already perceived as overly arcane and bureaucratic. Moreover, it is difficult not to see the Task Forces, as used so far, as "sticking plasters" applied too late to address perceived deficiencies in an already-running Programme: if Framework Programmes and associated specific programmes are designed "correctly" in the first place, the latter combined to provide more cohesive scientific areas, and incorporate the appropriate flexibility and interface processes, formalised oversight by a matrixed network of Task Forces should be entirely unnecessary.

6. PROCEDURES

6.1 There is much to admire in the way that relatively few Commission staff organise this dauntingly complex and large operation and their willingness to listen and respond to "customer" requirements. However, the Framework Programme is still perceived as overly complex and bureaucratic.There is some injustice in this, as the scale of the enterprise and its breadth of coverage, coupled with the Commission's evident sensitivities to earlier charges of "back door" political influence, lobbying and nationalism, necessitate a fairly elaborate series of checks and balances. The systems in place are basically sound but seem to have gathered "frills" of complexity, perhaps as historical inheritances or in response to "local" pressures. Nevertheless, the complexity often appears to be all-pervading and is certainly off-putting to most potential applicants.

6.2 The Commission should constantly be looking for opportunities to strip away complexity, variations in process, delays and lack of transparency. The gains from the EU adopting an overtly pro-active and high profile role in this regard—for example by establishing a roving Working Group dedicated to the review and simplification of every Framework Programme procedure—would be substantial.

6.3 The feedback to unsuccessful applicants should also be standardised at the best achievable quality. Currently, at its worst, it is completely unhelpful in guiding improvements for resubmission, where appropriate.

6.4 A two-stage application process has been adopted under some programmes, limiting the time applicants need to commit to proposals that are unlikely to be successful. This process is only of value if the first stage prompts a serious technical evaluation. If it merely excludes those proposals that self-evidently fall outside the remit of the work programme or fail on technical grounds (ie too few partners, etc), then it will add little value for the majority of applicants. A serious but provisional ranking of outline proposals and the exclusion of the weakest band in a first-pass review step will greatly increase, however, the reviewing burden on the Commission and the scientific community, and probably delay the overall process. This may thus be deemed unachievable. If so, it would again help simplify FPV as a whole if the concept were not patchily applied in a sub-set of areas, seemingly with no distinctive scientific or technological rationale.

6.5 Concerns have been raised about the quality of the peer review process and the feasibility of achieving sensible evaluations from a pre-selected but small panel, however broad their interests, with very time-limited exposure to the written applications in sealed rooms in Brussels. The Commission has data that demonstrate the quality of this process and they should be encouraged to publish this and to foster peer interrogation of their analyses. More conventional peer review, by distributing proposals to experts in relevant fields, would impose an enormously increased administrative burden and inevitably delay the overall decision-making process quite markedly. Nevertheless, there seem to be inter-programme variations in practice that are difficult to justify, and sharing "best practice" would seem sensible. As national funding programmes usually invoke this latter type of peer review, care is needed to avoid the establishment of two tiers of funding and project quality through the use of potentially less informed review in the EU tier (even if this is sometimes more a question of perception by the scientific community than reality): the EU should therefore investigate the feasibility of adopting a more conventional peer review process, including harnessing the established skills that many national funding councils have in this regard. Mechanisms to delegate reviewing back to national bodies without initiating national quotas for EU funds, and with sensible quality and consistency assurance mechanisms between reviewing bodies, should therefore be explored.

6.6 We fail to see the merits in pre-determining the type of funding that can best be applied to a given scientific objective, irrespective of the nature of the project and the ingenuity of applicants. While we acknowledge that the EU has emphasised that a "shared cost" proposal in a field designated for preferential support by concertation is not *a priori* excluded, feedback from the first rounds of FPIV has reinforced the message that to step outside the expected modality is to invite selection pressures in one's disfavour. We would also argue that the wide range of funding options in different specific programmes adds to the perceived complexity of the design and application process without gaining significant value, and that this range could therefore usefully be reduced and standardised.

6.7 The size of individual projects should be determined by what is necessary to achieve the desired results effectively, without waste and diffusion of purpose, and in an internationally competitive way. That this will vary between projects is self-evident, and greater flexibility to accommodate larger plans, without making this scale obligatory for all applications to any given area, would be beneficial. While all-encompassing *grands projets* can seem to be purposeful approaches to high priority targets, they often prove unwieldy and less productive: the concept of funding a portfolio of autonomous projects within a prioritised set of cohesive objectives is often more efficient, and captures the benefits of a healthy degree of inter-project competition. Similarly, concertation should not be favoured over shared-cost formats simply because it is a means of funding more projects within a given budget limit, since it is often not the most *effective* funding mechanism.

6.8 There is certainly a need to abolish the requirement from some but not all programmes for applications to be made on original hard copy (orange) forms from Brussels: to continue to insist on this nowadays simply ignores the capabilities of modern electronic communications and the realities of linking different research groups across an expanding Union who are working to demanding timescales. The same applies to the insistence on original signatures on the top copy submission.

6.9 The complexity of the timetable for Framework Programme applications is a significant obstacle to potential participants such as SB, with multiple scientific interests necessitating the tracking of more than 50 separate deadlines over the duration of FPIV. This complexity is exacerbated by the regularity with which deadlines are altered by the Commission. It must be feasible to standardise the timetable within and between specific programmes to a greater extent.

6.10 Finally, any moves to simplify the language of Framework Programme documents, and to reduce their duplication, must be welcome. Is it useful, for example, to have both work programmes and information packages for the specific programmes?—these duplicate much of the information unproductively. For programmes such as *Esprit,* the documentation alone is dauntingly complex with multiple sub-packages whose relevance to any given proposal is not immediately discernible.

7. Dissemination and Exploitation of Results

7.1 SB would welcome a continued and clarified focus on the management of Framework Programme consortia, since this is as much a determinant of progress and exploitability as is the scientific content of the proposal. We believe that, by simplifying other aspects of the whole procedure, more time and effort can be committed by consortium partners to establishing imaginative and effective ways of running the project, sharing ideas and results, and building truly effective cross-border and multi-disciplinary consortia.

7.2 While the delineation of an exploitation plan is desirable, and clarification of the desired proximity of Framework Programme-funded R&D to the market-place is essential, we would urge caution in attempting to make these plans either too early or too prescriptive, especially in economic terms. If FPV is to be perceived as a source of very innovative and generically relevant science, the uncertainties inherent in delineating the details of future exploitation should be recognised. There is usually little difficulty in distinguishing those projects that have real and exciting, but imprecise, prospects from those that have little real notion of future applicability beyond an optimistic hope that "something will come up". There is a real risk that demanding tightly delineated economic and social dimensions will favour the predictable and the merely incremental over the truly novel.

7.3 The delineation of intellectual property rights in the new model contract for FPIV remains discouragingly complex and too many non-participants in a project retain rights of access, albeit with the (vague) proviso that legitimate business interests are not thereby compromised, and also with the assumption than an increasing scale of financial charges will apply with increasing distance from the project's consortium. Nevertheless, the complicated lists of different access formats do not attract enthusiasm from potential partners in the commercial sector. The EU should simplify these, and should emphasise far more clearly the assumption that industrial members of consortia will exploit the results of Framework Programme projects and will retain exclusive rights to do so, subject to negotiations within their individual consortia. The EU should make it clear that the successive "layers" of IPR transfer are intended to apply only if and when the industrial partner(s) in the consortium decide that they do not wish to take up their preferential rights. At present, the whole range of access and exploitation rights is presented as a continuum. We feel that the Commission has been reluctant to be as unequivocal as this because of its hesitation in promoting European competitiveness through realistic support of individual European companies, as raised above. Nevertheless, we feel that this is an area that can only remain ambiguous at the expense of increased industrial participation.

7.4 We support the publication and dissemination of Framework Programme-funded R&D results to the extent that this does not compromise industrial exploitation potential. This is how we handle many of our other collaborations with academia and within consortia. Smaller companies and those with less extensive R&D interests may find this harder to accept. Separate elements of Framework to promote the dissemination of results ("3rd Activity" measures) are poorly effective in competition with the primary scientific literature and should be very critically reviewed: we favour placing the obligation for appropriate dissemination measures on the participants in each project, as an integral part of their award.

8. Less Favoured Regions

8.1 Integrating the objective of economic and social cohesion across the EU within the context of EU R&D support is compromising the ability of FPV to deliver scientific and technological benefits within the global competitive environment. The less favoured regions policy has a poor reputation within the scientific community and therefore loses the Framework Programme significant credibility amongst its highest calibre potential applicants. It might therefore be better if this, essentially political rather than scientific, objective were more openly acknowledged and funds separated to support the inclusion of laboratories from the less favoured regions as adjuncts to pre-formed FPV consortia. The purpose of such adjuncts would be quite explicitly learning and technology transfer, and this should attract no advantage during the peer review process for the "host" project: FPV projects themselves would then be selected purely and transparently on their merits. The availability of additional funds to foster training and experience in less well-placed laboratories would probably be a sufficient stimulus to consortia to consider this partly altruistic addition to their project, and the improved clarity of purpose of the arrangements would benefit everyone.

8.2 The participation of laboratories from less favoured regions who are full partners with all the expertise to achieve their place in competition with groups from the technically more established countries should neither attract contributions from this separate "cohesion" fund nor an advantage during peer review. Since they achieve their consortium place on merit, there seems no logic in giving them additional "value" in the project selection process simply on the basis of geography.

9. Third Countries

9.1 The ability to build on EU-negotiated agreements with other blocs and individual countries is a valuable aspect of Framework Programme R&D. The range of EU-initiated technical support initiatives is, however, very complex (INTAS, PHARE, TACIS and numerous other programmes have science and technology components, to add to the dedicated activity within FP IV). As with all other complexity within EU R&D programmes, this can actively impede the participation of new entrants. "Third country" initiatives should therefore be combined and simplified as far as possible. The tenor of our suggestions with regard to EU less favoured regions applies here as well: there can be two objectives in "international co-operation" in Framework Programme terms—(i) overt training and technology transfer and (ii) "intrinsic merit" participation as full and equal partners. We feel that these initiatives will be clearer to operate if these two objectives are recognised and separately funded.

April 1996,
revised *October 1996*

FRAMEWORK V (EU FUNDING FOR R&D): MEDICINAL CHEMISTRY AND ALLIED FIELDS

Summary

Framework IV largely omits medicinal chemistry and a number of allied scientific fields, although these are vitally important components of a major successful European asset—the pharmaceutical industry. As biology becomes increasingly based on molecular understanding to yield unprecedented opportunities for discovering new medicines to treat major unmet medical needs, it merges into chemistry and this is an area that Europe cannot afford to neglect. We therefore recommend:

- overt recognition should be given to the central, strategically vital, role of medicinal chemistry in European competitiveness and wealth creation by the incorporation of selected areas of chemistry within Framework Five (FPV)
- innovation at the interfaces between modern medicinal chemistry and other major foci within Framework should be encouraged by flexible Calls for Proposals and selection procedures, especially with:

  biological sciences

  materials sciences

  information technologies

  and the wide-ranging place of chemistry as a crucial enabling technology should be reflected in the format through which FPV accommodates this science
- medicinal chemistry should be regarded as a valuable opportunity for building links with third countries within INCO and other EU international initiatives
- medicinal chemistry should continue to be eligible for funding through the Training & Mobility of Researchers (TMR) Programme, and steps should be taken to improve the take-up of this option as part of a publicity campaign to make chemists aware of Framework as a relevant contribution to their science base.

1. Introduction

1.1 *Coverage of chemistry within Framework IV is limited and very fragmented:*

Industrial & Materials Technologies Programme (Brite-Euram 3):

- new technologies applied to improve production efficiency (cost-effectiveness, productivity, quality, flexibility, time-to-market, etc.) or to reduce environmental impact
- application of automation, artificial intelligence and miniaturisation to improve production processes

- re-cycling, reduction of waste and reduced use of hazardous or environmentally deleterious components
- development of sensors (for process control)
- development of catalysts, including basic research on surfaces and interfaces, and materials deposition technologies
- synthesis and quality control of advanced material and chemical intermediates
- improved modelling of complex kinetic and thermodynamic variables during processing, to improve material characteristics
- molecular and nano-engineering to design material structures from the atomic scale upwards
- scale-up of surface and interface chemistry, bioprocess engineering, supramolecular chemistry

These specifications focus emphatically on processing and production, albeit enabled by new physico-chemical methods.

Biotechnology Programme:

- aspects of structural biology (see 2.3 below), including improved methods for structure determination with extended ranges (to accommodate macromolecules)
- biochemical engineering of cell factory production systems
- biocatalysis and biotransformations, including multi-phase reactions
- structure-function relationships for biological macromolecules (see 2.3 below)
- rational design of biomolecules with predefined properties, including the interface of biomaterials and nanotechnology with electronics (e.g. biosensors)
- information infrastructures for interrogating biotechnology databases, including sequence and structure collections

These areas are crucial interfaces for medicinal chemistry, but the work programme offers little scope for explicitly chemistry-orientated research.

Biomedicine & Health Research Programme:

- relationships between chemical structure and pharmacokinetics and toxicology
- novel drug discovery methods for new ligands for potential drug targets
- application of analytical methods (e.g. magnetic resonance) to imaging
- sensor technologies for diagnosis and clinical monitoring
- biomaterials, e.g. for artificial organs

Although much of the rest of this Programme focuses on neurological, cardiovascular, cancer, immunological and infectious diseases, and thus includes new treatments, the emphasis is almost wholly on understanding new biological mechanisms underlying disease pathologies. Again, these Framework objectives offer important interfaces for a medicinal chemistry focus.

Information Technologies Programme (Esprit 4):

Includes aspects of microprocessor/controller technologies, information extraction/analysis and computing infrastructure pertinent to medicinal chemistry, but in generic terms.

Standards, Measurements & Testing Programme:

- improvements in the accuracy, sensitivity and range of applicability of research instruments and methods of chemical analysis, including data analysis
- measurement systems in process control, including transfer of high performance laboratory systems to the production environment
- development of measurement systems for quality control, and for monitoring safety and environmental impact

These specifications are complementary to, but do not directly address, advances in synthetic and medicinal chemistry for generating novel therapeutics.

Training & Mobility of Researchers (TMR) Programme:

— free selecton of topics for fellowships, research networks, etc.

1.2 The European pharmaceutical industry is one of the EU's most successful and internationally competitive industries, contributing directly to wealth creation and to improving the quality of life of EU citizens through the discovery and development of better medicines. European pharmaceutical production, for example, represents over 40 per cent of the worldwide figure, significantly ahead of the USA (31 per cent) and Japan (19 per cent). Of the world's 15 largest pharmaceutical companies (by pharma sales in 1994–95), five are EU-based[1], with three others (Roche, Sandoz and Ciba pre-merger) being Swiss. The pharmaceutical industry is the 2nd most research intensive (after aerospace) worldwide, so that it is uniquely sensitive to the quality and capacity of the local science and technology base: nine out of the top 15 R&D spenders in the sector are European[2].

Metric	*1993 value (million ECUs)*
Production	79,008
Exports (to non-EFPIA countries)	14,393
Imports (from non-EFPIA countries)	4,010
Trade balance	10,383
R&D expenditure	9,868
	Persons
Employment	539,528
R&D employment	80,961

Source: EFPIA (European Federation of Pharmaceutical Industries' Associations) Annual Report 1994–95; EFPIA differs from the EU in including Switzerland and Norway but excluding Luxembourg. EU data for 1993 are 64 billion ECU for production and 413,000 for employment (European Report on Science & Technology Indicators, 1994).

Of the top technology-intensive sectors, only chemicals and pharmaceuticals continue to show an increasing trade balance for Europe[3]. Six out of the top 10 bestselling drugs in 1995 were discovered in Europe[4].

Because, directly or indirectly, virtually the whole of this value derives from the application of medicinal chemistry, the socio-economic case for EU investment in relevant areas of science and technology to maintain the leading status of this industry is thus overwhelming.

1.3 As emphasised in our earlier, general inputs to the consultation process on Framework Five, SmithKline Beecham Pharmaceuticals (SB) supports this continuation of the EU's commitment to innovation, scientific excellence and a strong R&D base. We value the European dimension to complement national and global perspectives and we remain committed to working with the Commission and other interested parties in developing the Framework concept to encourage greater industrial participation and to maximise its industrial benefits.

1.4 Nevertheless, we find puzzling the mismatch between the importance of chemistry, as applied within the pharmaceutical industry[5] and elsewhere, and the current Framework design. A number of areas able to interface with medicinal chemistry feature in FPIV (see 1.1) but the central "core"—synthetic chemistry—is missing from the Programme. This document therefore attempts to stimulate a debate on the inclusion of medicinal chemistry within FPV. We freely acknowledge that there are many other industries that rely on chemistry[6], but we have focused on those areas relevant to the pharmaceutical industry, specifically at the laboratory, rather than production, scale. Organisational issues are discussed in more detail in our earlier inputs to the Commission and to UK national bodies.

---

[1] Glaxo Wellcome, Hoechst Marion Roussel, Pharmacia-Upjohn, SmithKline Beecham, Rhone-Poulenc Rorer (Scrip Magazine, January 1996).

[2] 1995 data from Scrip, no. 2137, p. 10 (1996).

[3] EU Report on Science & Technology Indicators (1994). This report also includes data showing that the European chemicals industry has a greater output than its USA equivalent and is the world's leading exporter of chemical products, that six out of 10 of the world's largest chemical companies are European, and that the chemical industry excluding pharmaceuticals employs 1.25 million people in the EU. Thus, the strong pharmaceutical sector in Europe is partnered by an equally strong chemicals industry.

[4] Scrip, no. 2132, p. 24 (1996).

[5] As delineated in more detail in this document, the chemistry that is relevant to the pharmaceutical industry extends widely and is increasingly interfaced with many other classical disciplines. For convenience, this whole area is referred to in this document as "medicinal chemistry".

[6] As discussed, for example, in Chemical Science and Technology: European Needs for the 1990s (Eur. Communities Chemistry Council, 1990); Community Support for RTD in Chemical Sciences and Technologies (European Chemical Industry Council CEFIC and others, 1993); AllChemE Report on European Basic Chemistry (Alliance for Chemistry in Europe, 1996).

2. TECHNOLOGICAL OPPORTUNITIES WITHIN MEDICINAL CHEMISTRY

2.1 Medicinal chemistry can best be regarded as a core technology that underpins and interfaces with a rapidly increasing range of scientific and technological areas. The classical boundaries of chemistry are no longer valid: biology has been described as just chemistry we don't yet understand. In some respects, therefore, the lack of a coherent chemistry strategy in the Framework Programme is worse than the "mere" omission of one area of science, although this would fail to capture major opportunities to harness Europe's chemistry skills. Rather, it risks wider deficiencies through a generalised lack of the ultimate molecular perspectives, reducing the effectiveness and impact of those interface areas that are currently within Framework, and failing to achieve the best cost-effectiveness for the EU's Framework investment.

In delineating the technical areas below, it is not our intention to argue for a closely defined chemistry initiative within FPV—as we have stated in previous inputs, we favour broadly-specified work programmes to match prioritised scientific objectives, in order to leave room for innovation—but rather to illustrate the need and potential for new developments in chemistry.

2.2 Areas that would benefit from a greater Framework emphasis on chemistry include:

- Combinatorial chemistry: This is stimulated by the need to investigate a greater range of molecular diversity in the search for new therapies (but the same applies to the need for new materials in many other areas of industrial endeavour). Its full exploitation requires new synthetic pathways, especially the generation of a range of solid-phase synthetic methods as comprehensive as those already available for classical solution chemistry. The need for combinatorial chemistry to be economic in its use of reagents has driven this field to work at the nanoscale. In turn, this has stimulated the refinement of advanced analytical techniques, such as mass spectroscopy, that allow the identification of products on single beads, thereby making methods for tagging the products to allow the efficient identification/isolation of active moieties somewhat obsolete. The number of compounds produced by competitive combinatorial chemistry, and the need to use skilled chemist time efficiently, mandates the incorporation of automation as far as possible. This is thus a prime example of a field in which a core of (novel) synthetic chemistry is intimately linked with other technologies, extending beyond the traditional boundaries of the discipline. The field also exemplifies very well the scope for accommodating basic, pre-competitive research with subsequent industrial applicability in reaching Framework's competitiveness objective.
- Asymmetric synthesis: The search for greater selectivity for drug molecules interacting with closely similar receptor sub-types or iso-enzymes, plus the desire for ever better therapeutic (benefit:risk) ratios, will probably drive medicinal chemists progressively to incorporate further complexity, much of which will introduce further chirality. Improved methods for stereoselective sythesis will save time, materials and money, while rendering as achievable a number of synthetic goals that might otherwise remain commercially non-viable. Both wealth and health in the EU will benefit directly.
- New chemistry: Carbohydrate chemistry, and the significance of carbohydrate moieties on biologically relevant macromolecules, are rapidly developing fields with considerable potential for therapeutic manipulation.
- Catalysis: The scope for catalysis to reduce waste, costs and environmental damage is self-evident and the chemical industries already rely on this science. Nevertheless, the pharmaceutical industry, because of its focus on high-value, moderate-scale products, is likely to be in the vanguard of further substantive advances, such as the exploitation of (regio- and stereo-selective) biocatalysis, catalytic antibodies and artificial enzymes, whereby genetically engineered biomolecules act as chemical reactors instead of drug targets. Heterogeneous systems allowing continuous production, switchable catalysts able to be directed at will towards semi-customised products, and homogeneous and multi-phase reaction systems are all likely to be of interest, while environmental concerns will prompt attempts to replace heavy metals as catalysts. Catalyst design is likely to aim for increasingly specific transformations.
- Surface chemistry: As well as influencing combinatorial chemistry through the development of more efficient solid-phase synthetic methodologies (which will also require advances in polymer chemistry for a wider range of supporting matrices), this area will provide a much greater range of sensor systems, including biosensors. These will aid the rapid routine diagnosis of disease or facilitate preclinical studies on drug candidates by monitoring xenobiotics and their metabolites. They will form the basis for self-regulating (intelligent or programmable) drug delivery systems. These applications will be coupled to synthetic membrane technology and electrochemistry for signal transduction. This field is likely to spill over into advances in particulate science and powder technology, which are key areas, inter alia, for novel drug formulations, but again also for the creation of new materials generally.
- Computational chemistry, molecular modelling and QSAR: Linking directly with structural biology (see below) and biomedical mathematics, new computational algorithms will directly improve the efficiency of drug design and hence reduce the time and cost involved in delineating the

most potent, selective and efficacious agents able to achieve a desired pharmacological effect. This will demand new computational/modelling tools with which to search 3D structural databases for both macromolecules and small molecular weight ligands in order to define potential intermolecular interactions, to design lead structures in a truly rational and *de novo* way, and to identify automatically those features providing selectivity over competing biological targets. In addition, new databases based on the structural and reactive features of the drug (ie its chemistry) will introduce predictable metabolic behaviour, absorption across biological barriers (gut, skin, mucosal, blood-brain barrier, etc), pharmacokinetics and pharmacodynamics, and toxicological potential, thereby reducing the time and cost involved in preclinical development and obviating one of the major causes of failure in the R&D process. Reliable computer-based predictions of reaction rates, selectivities and conditions, and computer-assisted optimisation of synthetic routes, will link expert molecular design more closely to efficient laboratory implementation.

— New extraction, purification and analytical methods: New technologies are being developed with increasing rapidity, e.g. supercritical fluid extractions, bench-top mass spectrometry applications, *in vivo* nmr spectroscopy, atomic force microscopy, chiral filters, etc. Miniaturisation of analytical methods to economise on materials and for speed, in-built quality control and convenience (e.g. “analysis on a chip” approaches) is a major goal with benefits also to the environment through reduced levels of waste. Not only are these advances adding to the resolution, sensitivity and range of analysis achieved by the dedicated analytical chemist, but they are increasingly being applied directly by the synthetic chemist, and finding application in the study of macromolecules and biologically relevant molecules (see below). Natural products remain a significant source of pharmacologically active lead molecules, necessitating improved rapid and high resolution separation, structural determination and (semi-) synthetic methods.

2.3 The core role of chemistry in the “molecular revolution” provoked by molecular biology and genomics may be considered at two levels.

(i) At the first level, molecular biology will falter if it cannot transform itself into submolecular and intermolecular understanding—otherwise definable as chemistry. Chemistry is required to understand the structure, and hence the function, of biological macromolecules and their interactions with ligands (for receptors), substrates (for enzymes), etc (molecular recognition). Yet more fundamentally, the transcriptional regulation and post-translational processing of the biological messengers themselves depends on intermolecular interactions that also need to be understood at the chemical level.

This is an area that is especially amenable to industry-academia collaboration, since the scientific problems are challenging enough to satisfy the academic need for novelty and fundamental advances, and relevant enough to engage industry in exploiting the new knowledge directly. Indeed, so important is this area to the pharmaceutical industry, that many companies are making both substantial investments in the area and major fundamental advances.

(ii) At the next stage—that of converting this fundamental (chemical) understanding of the processes of life and cellular function into safe and effective drugs—chemistry, of course, becomes the critical enabling tool (see section 2.2). Macromolecular drugs—including gene and anti-sense therapies—will increasingly be exploited, but their site-specific delivery and protection against metabolism will depend on new chemical knowledge. These aspects are also very pertinent to small molecule medicines, which will continue to dominate the marketplace because of advantages of cost, tissue penetration, intracellular and intranuclear accessibility, etc. over macromolecules. The intrinsic characteristics of the drug candidates themselves—whether macromolecular or small molecule—will often be modified by sophisticated pharmaceutical formulation, but this can also be regarded as replacing the chemical characteristics of the drug with those of a more appropriate vehicle. The range and predictability of behaviour of such variations will also increase rapidly.

The combination of the biological and chemical arms of the molecular revolution will deliver an explosive increase in the number of drug targets and candidate molecules designed from pharmacological activity. This will continue to prompt major technology fusions, as automation, robotics, miniaturisation of screening systems based on microfluidics and opto-electronic detection systems, automated data capture and intelligent data mining contribute to the high capacity, high speed evaluation of lead molecules. Although not strictly chemistry, these technologies will need to be integrated closely with practical synthetic chemistry if their full potential for speed, reliability and efficiency is to be developed.

Finally, as the pharmaceutical industry extends its range of healthcare solutions, chemistry will again play a key role in the associated biomaterials development (implanted drug depots, sequestered cell factories, tissue replacements, the incorporation of biodegradability), and possibly the generation of synthetic nutriceuticals (pharmacologically active foodstuffs).

Chemistry thus pervades the entire “molecular revolution” and it would be wrong to regard the latter as purely a biological phenomenon, as is implied by the biological emphasis in most of the basic Research and Development supported by FPIV. Reduced costs-per-drug-introduction, through the advances in chemistry capabilities summarised above, will also bring into the bounds of commercial viability many diseases that are currently commercially unattractive targets. The potential impact of this development would be enormous.

2.4 As well as being critical skills that European industry and academia cannot afford to neglect if they are to remain internationally competitive, many of these areas are amenable to the retention or achievement of European leadership, given adequate investment. The UK Technology Foresight exercise identified biological, organometallic, chiral and medicinal chemistry; organic synthesis; molecular biology and molecular modelling technology as internationally competitive strengths in this area, and the very strong skillbase in chemistry in Germany has been well-recognised for decades. To use one frequent, if simplistic, metric of scientific success, the predominance of the United States of America in capturing Nobel Prizes since World War Two has been far less marked in chemistry than in physics or medicine.

2.5 Nevertheless, the European Union must face the reality that "chemistry" is, unfortunately and mistakenly, widely regarded within Europe as a source of pollution and risk-without-benefit. Any moves to increase the resources committed to chemistry in FPV may provoke vocal opposition. The timescale of FPV is likely to see further moves to enlarge the Union to include Central and Eastern European states with complex pollution legacies from poor historical environmental policies, which will exacerbate the anti-chemistry argument. Any socio-economic funds within FPV would therefore do well to promote the generation of better understanding among European Union citizens of the vast benefits that chemistry, through both the pharmaceutical industry and many other "chemical" industries, has achieved in Europe and worldwide.

2.6 A related matter of major concern is the changing population of students undertaking training in chemistry at advanced levels and thereafter seeking employment applying their chemical skills directly. The widespread "flight from science" contributes to high calibre students choosing other paths for tertiary education or in early career choices. Greater social acceptability, promoted by FPV-supported initiatives and by practial steps to implement relevant aspects of the recent Green Paper on Innovation[7], can influence this positively in the longer-term. TMR can make shorter-term contributions (see section 3.3)

At a more complex level, the unemployment situation across much of Europe encourages a wider band of students to continue into post-graduate education, thereby producing increased numbers of only moderately able PH.D. chemists who are not able to compete effectively at the highly competitive post-doctoral recruitment hurdle, but who have become over-qualified for recruitment as graduates in technologically demanding (and therefore globally competitive) industries. Framework V is not an appropriate means of addressing this situation, but moves to improve the success-rate for TMR post-doctoral fellowships by reducing the budget for post-graduate awards, which we generally support, could deleteriously accentuate the inappropriate drift of moderately able students to further degrees.

3. MEDICINAL CHEMISTRY WITHIN FRAMEWORK V

3.1 Several options merit consideration as effective ways of incorporating medicinal chemistry within FPV. For convenience, these are proposed within the format of FPIV, but we would welcome discussion of a more radical redesign. Although chemistry underpins a huge proportion of Europe's industry, Framework needs to support the fundamental research that will maintain our competitiveness in the future, not attempt to intervene at near-to-market stages with a purely short-term perspective.

- creation of a dedicated medicinal chemistry Thematic Programme. This has clear advantages in terms of its prominent profile and scope for acting as an effective focus. This would give a clear message to the chemistry community that Framework has become a relevant resource for strengthening their science base. Nevertheless, much of the dialogue about FPV is currently centred on reducing the number of Thematic Programmes in order to create more cohesive designs that actively foster the exploration of new interfaces. Moreover, "isolating" chemistry as a discrete Framework area risks losing the value of regarding it as a fundamental underpinning technology that should be applied to numerous priority areas warranting EU funding.
- inclusion as new areas within pre-existing Thematic Programmes, according to the interfaces delineated in the previous section, perhaps as clarifications and greater emphases in the areas delineated in section 1.1. This minimises the overall redesign of FPV required to accommodate medicinal chemistry, but risks excessive fragmentation, loss of interfacing potential and poor visibility as a European R&D priority. Most importantly, the cohesive "core" of synthetic chemistry would still largely be lacking. This format would fail to stimulate high calibre proposals from industry and academia to contribute appreciably to the EU's innovation in the field.
- inclusion of an overtly chemistry-based core as a new, well-resourced domain of a substantially re-positioned Industrial & Materials Technologies Programme (Brite-Euram), with a clearly emphasised remit to bridge to other areas in order to capture the major interfaces that could underpin continued European success in this sector. This has the advantage of linking medicinal chemistry with the larger-scale chemistry involved in production and process development in other

---

[7] EU Green Paper on Innovation, Routes of Action #3, #5, Chapter IV.2 (1995), etc.

parts of Brite-Euram 3. We would recommend this if it forms part of an imaginative re-alignment of physical sciences and technololgy to balance the cohesion developing in the life sciences parts of Framework.

3.2 IPR issues and the emphasis on pre-competitive research for Framework are particulary important in designing a better chemistry focus for the Programme, because, ultimately, the products of a successful medicinal chemistry project in industry are both proprietary and highly competitive. Framework Programmes should not become involved in projects of this near-to-market, direct application nature, but rather seek to develop more generic capabilities. Nevertheless, it is important to recognise that individual companies will seek to establish competitive advantages through the development even of such widely applicable technologies, and this is a legitimate objective justifying their investment of time, expertise and matching funds. Moreover, European competitiveness will only be enhanced in practice through the improved performance of individual companies.

3.3 The number of applications to the TMR Programme with a predominantly chemistry orientation is surprisingly low. We believe that this is less a symptom of limited need or capability than evidence that the chemistry community regards Framework as of little relevance to them, because of the paucity and fragmented nature of its chemistry content. A more cohesive and emphatic investment in chemistry in FPV would be expected to restore a more representative level of interest in chemistry within TMR. We therefore recommend that, whichever route is taken to include chemistry more centrally within FPV, the Commission institute explicit publicity and communication exercises to ensure that the new opportunity attracts sufficient high quality interest from both industry and acadamia.

The key role of chemistry in the molecular revolution emphasises the need for scientists trained at the interface of biology and chemistry. TMR may thus be an appropriate vehicle with which to encourage greater cross-disciplinary transfers for post-doctoral training, perhaps through the advantageous scoring of such proposals.

The pharmaceutical industry cannot afford to neglect chemistry, and clearly invests heavily both internally and through extensive wholly-funded collaborative projects with academia. This may tempt the public sector to abdicate from supporting fundamental chemistry research, threatening an area of historical European strength by failing to train the next generations of chemists. FPV must avoid this temptation.

3.4 Chemistry is a science for which a number of countries in Central and Eastern Europe, and in other countries such as India, have strong historical and current skillbases. This would therefore seem an entirely appropriate area for priority funding within the various EU international S&T co-operation initiatives, including INCO or its FPV successors.

July 1996

FRAMEWORK V (EU FUNDING FOR R & D): TRAINING & MOBILITY OF RESEARCHERS

SUMMARY

The Training & Mobility of Researchers Programme (TMR) within the Framework initiative is of particular importance to the pharmaceutical industry because:

- the maintenance of a well-trained, flexible pool of scientists and technologists within the European Union science base is of crucial importance to the competitiveness of the industry and its heavy investment in Research and Development within Europe.
- the responsive-mode format of the TMR Programme complements other elements of Framework to encourage innovative proposals beyond the limitations of pre-determined work programmes and at newly emerging technology interfaces.

SmithKline Beecham therefore regards TMR as the most important single component of Framework IV, and strongly supports futher enhancements to the Programme in Framework V, including a share of the benefits from a more selective focusing of European Union funds on a smaller group of priority initiatives. The main recommendations that we would like to make are:

- the system should be re-instituted whereby host institutes can win TMR Awards with pre-defined projects, for them to find and hire suitably qualified candidates in a timely and efficient way.
- all post-doctoral and post-graduate training awards, and other training options, should be combined within a "cross-matrixed" TMR Programme that is equally accessible from all Thematic Programmes as well as for candidate-designed projects addressing other topics.
- Ph.D. finishers should be eligible for TMR research training fellowships within a more flexible timetable, contingent upon their successfully obtaining their higher degree before taking up the new position.

- triangle fellowships under the TMR Programme should be used to build new working relationships between centres, as a prelude to building subsequent Framework consortia.
- Established Researcher (B40) options should allow laboratories from outside the Less-Favoured Regions to act as hosts, thereby making this scheme accessible to the large and more successful European industries.

1. INTRODUCTION

1.1 As emphasised in our initial inputs to the consultation process on Framework Five (FPV), SmithKline Beecham Pharmaceuticals (SB) supports this continuation of the European Union's commitment to science and technology, and values the European dimension to complement national and global perspectives on Research and Development funding from the public sector. We remain committed to working with the Commission and other interested parties in developing the Framework concept to encourage greater industrial participation, and to maximise industrial benefits without deleteriously distorting the nature and productivity of innovative enquiry.

1.2 The Training and Mobility of Researchers Programme is of critical importance to SB and the European pharmaceutical industry, because:

- the maintenance of a well-trained, flexible pool of scientists and technologists within the European Union science base, both as a source for recruitment of staff and as prospective partners in collaborative Research and Development, is of crucial importance to the competitiveness of the industry and its heavy investment in Research and Development within Europe. Furthermore, Europe produces fewer trained scientists and engineers than do our major competitors [8].
- the responsive-mode format of the TMR Programme complements the more contractual format of the other elements of Framework to encourage innovative proposals beyond the limitations of pre-determined work programmes and at newly emerging technology interfaces.

This document therefore builds on our previous, more widely-directed, inputs to the FPV consultation process to dwell on our views and suggestions for the TMR Programme in the future. We have included here some responses to the first report from the Working Group Industry set up by the TMR Programme Committee to investigate why industry has failed to participate in the HCM and TMR Programmes as fully as it might. We have concentrated on the Training Grants (Marie Curie Fellowships) and Research Networks, since these are the Programme components of greatest relevance to industrial participation.

2 COMPARISON OF ASPECTS OF TMR WITH FRAMEWORK THEMATIC PROGRAMMES

TMR has a number of characteristics that avoid some of the criticisms we have previously levelled at other components of Framework IV, and we would recommend that these positive features are considered for wider application, where feasible.

2.1 Reduced bureaucracy: All TMR documentation is available from the Commission's Internet site, including electronically transmissible application forms, which can be photocopied freely. This makes the acquisition of up-to-date information, and the sharing of draft applications, very much easier than is sometimes the case for the Thematic Programmes, e.g. due to their reliance on original application forms available only directly from Brussels. Furthermore, the application process for TMR is relatively straightforward, though there is scope for improvement as delineated below. Recent changes to the application forms are welcome, e.g. to make the referee's input more realistic and relevant (though having it forwarded via the candidate doesn't promote truly disinterested, confidential review), as are recent successful efforts to accelerate the review and selection processes.

We welcome recent moves to switch the monitoring of TMR projects towards a system of spot-checks on the basis of assumed compliance with contracted obligations, in preference to over-burdening candidates or supervisors with additional reporting obligations. The priority must be practical training and experience, with writing being directed towards the publication of manuscripts for peer-reviewed journals, not documentation for the Commission's filing systems. This uses an existing, effective dissemination system—the scientific literature—in preference to any new EC-initiated and -funded development. It is reasonable to expect TMR-funded awardees to return a list of publications owing something to Framework funding to the Commission within, say, a year of completing the project and analyses of the resulting database should be both adequate and appropriate for retrospectively assessing the value and impact of the Programme as a whole.

2.2 Responsive mode applications: Whereas the Thematic Programmes adopt Work Programmes to delineate their desired areas of scientific innovation—and sometimes specify this content in excessive detail—TMR sensibly adopts a much broader remit and invites applications within any area of science and technology that can address Framework's general objectives of enhancing European competitiveness and our underlying capabilities. This makes TMR accessible to a key sector of the pharmaceutical industry that is otherwise largely excluded from participation in Framework, viz. medicinal chemistry and many of its associated fields. The potential additional complexity generated by the involvement of the Task Forces is avoided. Moreover, this freedom of endeavour allows highly innovative, even iconoclastic, proposals that, inevitably, will only poorly match predefined, consensual Work Programmes, to proceed. This includes newly emerging technical areas whose nature could not be defined at the time that a five-year Framework Programme is designed, itself two-to-three years before initiation and therefore up to eight years prior to the last stages of the Programme's life. New interfaces created by technology fusions and the merging of classical disciplines can also be more readily explored within this flexible format. TMR's flexibility is thus complementary to the higher degree of selective focus we would prefer to see in the choice of Thematic Programmes, and serves to reduce the risk that this latter prioritisation would be restrictive through lack of foresight. Overall, this orientation of the TMR Programme therefore facilitates the selection of the highest quality proposals from a list of applications that are intrinsically driven by "market" needs without the need for interventionist pressures from the Commission or its advisers.

---

[8] European Union Green Paper on Innovation , Tables 14-15 (1995); European Union White Paper on Growth, Competitiveness and Employment, Chapter 4 (1993).

2.3 Simplicity of funding modalities: In contrast to the too-broad range of funding mechanisms devised for the Thematic Programmes, which can cause confusion to applicants, TMR offers a limited range of options that meet most applicants' needs. As described below, we would favour an intermediate format between the "pure" transfer implied by Training Grants and the overt multiple participation required by Research Networks, but this need not add to the diversity of funding modes, since these formats would then create a flexible continuum.

2.4 Intellectual Property Rights: In marked contrast to the complexity of IPR options for projects funded by the main modes in the Thematic Programmes (shared-cost and concertation), the unambiguous assignment, for TMR Training Grants, of IPR to the host institute is welcome because of its realism and lack of equivocation. Obviously, there is freedom for the host institute to negotiate re-distribution of IPR with the TMR awardee, if appropriate. For TMR Research Networks, we would repeat our earlier view that the Commission's expectation that IPR will be assigned to those participants able to exploit the results, ie. usually to any industrial partners, is obscured by the cautious complexity of the current standard Contract.

In this regard, we would caution the TMR Working Group from too much reliance on greater publicity as the "cure" for perceived deficits in the TMR Programme, particularly if this was to be achieved by making the results of TMR-funded fellowships and networks freely available to non-participating companies through mandatory publication. As we have argued before, those companies that commit time, intellectual effort and funds to the supervision and accomplishment of Framework-supported projects must be able to derive a competitive advantage from preferential access to the project's results, if the private sector investment is to be justifiable. This does not compromise our commitment to the TMR Programme as primarily a training mechanism: rather, the most pertinent training experience and the most astute host supervision will derive from projects that are well-aligned with the mainstream foci of the industrial host laboratories.

Nevertheless, the industrial attendance at the UK TMR Programme launch in early 1995 (and subsequent TMR Information Days) has been a very limited proportion of the total. If this is due to limited industrial circulation of publicity directed almost exclusively to the academic community, then the Working Group is right to highlight the need for more appropriately directed publicity.

3. Opportunities to Enhance the Training and Mobility of Researchers Programme

3.1 We endorse the TMR Working Group's view that mandating industrial participation in TMR Networks would offer no advantages, since this is not always appropriate for the stage or nature of the work proposed. To compel networks to find industrial partners would burden companies with a steady stream of inappropriate enquiries.

In this regard, we welcome the more practical emphasis placed by the Commission on Networks' identifying and including industrial partners where and as the likely outcome of the project makes appropriate, and the associated influence on project selection. We urge the Commission to avoid any selection procedure that implies that proposals involving industry can be successful even if they are scientifically weaker than those based only in academia.

3.2 We favour post-doctoral fellowships as the focus of TMR Training Grants. We see no particular logic in regarding post-graduate training as the exclusive remit of national funding bodies, with only post-doctoral training and experience introducing a European dimension. Nevertheless, the majority of post-graduate training is conducted in the country of the student's origin or permanent residence and focusing TMR exclusively on post-doctoral scientists might allow procedural simplification, release funds from the limited post-graduate provision (*c* 52 million ECU in FPIV, or *c* 700,000 ECU per Member State per year) to improve post-doctoral success rates, and release administrative and peer review resources to allow accelerated decision-making.

3.3 The dispersion of research training grants between the TMR Programme itself (the majority in number terms) and some but not all of the Thematic Programmes (in small numbers only) seems to us to serve no useful purpose and is a source of confusion, not least because the overall "umbrella" training Programme, including the fellowships and networks awarded by the Thematic Programmes, has been entitled TMR, whilst the same term has also been used for the "sub-Programme" providing free choice of topic for the proposed project. Having different entry criteria (eg overt publication requirements for post-doc fellowships under the Biotech 2 and Biomed 2 Thematic Programmes but not, in theory, for the TMR options) is unjustified, and having different timetables for reviewing applications is unhelpful. Similarly, only some Thematic Programmes have Networks, but applicants have to be wary of making proposals to the TMR Programme that could be considered to fall within the remits of the thematic options. This leads to the somewhat bizarre, and surely counter-productive, practise of writing a research network proposal in a way that overtly avoids the content of a Thematic work programme, in order to match the TMR Network timetable or to access the greater funds within TMR. Because the funding modalities and entry requirements for the four formats of TMR support differ substantially from those applicable to supporting research consortia addressing the Thematic work programmes, it is probably operationally easier to have separate information packs for the TMR aspects, and we would prefer combining all training/mobility options within a single TMR Programme. Nevertheless, each Thematic Programme should have equal access to the full range of TMR options, which would therefore constitute a major underpinning ("cross-matrixed") activity for FPV as a whole.

3.4 The abolition of the HCM fellowships assigned to specific host institutes is understandable in terms of greater transparency, improved control/responsibility, etc. However, it has the consequence that the total period between the first moves to construct a TMR Training Grant application and the eventual funding decision is very long, however efficient the selection process within the Commission becomes. This has greater impact for industrial host institutes because their need to concentrate on research that is relevant to their business goals means that they usually contribute significantly to the design of the proposed project, and seek to encourage applications only in scientific areas of interest to them. Thus, companies may draft project outlines or priority fields and then actively seek suitable matching candidates from high calibre laboratories with proven capabilities in the field—all of which precedes the normal TMR process undertaken by purely academic candidates and host institutes.

Sensible applicants will not rely on this lengthy process for their next job and this means that the best applicants will too frequently find another post before the EC decision on their Framework application comes through, wasting much time and effort all round. We have lost significant numbers of good candidates both before and after project selection because of this factor. This has been sceptically but not entirely unfairly articulated as "selecting for good projects and average candidates". Although this is partly an inevitable result of most grant-awarding processes taking finite time to choose awardees, the earlier institute allocation obviated this in a way that has also been successfully adopted in the UK for many CASE[9]-type and ROPAS[10] fellowships, and we would strongly favour the restoration of host institute awards. A host institute can then attract serious applications directly and can respond immediately with a firm offer of a post on identifying suitable candidates. Market forces will ensure that such "assured" posts attract and go to the best quality candidates. Transparency can be maintained by the Commission continuing to delineate entry criteria (qualifications, experience, etc) and by requiring prospective host institutions to submit the topics or work programmes for which they seek fellowships—it is in no-one's interests to envisage a "blank cheque" quota system allocating TMR funds to host institutes without pre-defined and peer-reviewed research projects. Sensibly measuring the results of EU-funded post-doc/post-grad research, with feedback impact on the number of fellowships subsequently awarded to the host institution, can further contribute to meeting the Commission's responsibility for the fruitful use of EU R&D funds. We believe that this format would be faster and more attractive to both industry and the candidates themselves than the "brokerage" system suggested by the TMR Working Group, which would maintain the long period of uncertainty between identifying a suitable candidate-company pairing and the announcement of successful TMR awards. However, use of a CORDIS database as a means of facilitating these early contacts would be helpful whatever the subsequent mode of operation of the TMR Programme: this could be a more efficient and cost-effective way for host institutes with approved awards to seek applicants than through advertising in the technical press.

3.5 The same host institute fellowship mechanism might also encourage greater mobility from industry to academia, which the TMR Working Group found was even less well exploited than the reverse transfer. As the pace of technological advance increases exponentially, industrial researchers urgently need greater opportunities for up-grading and up-dating their skills—a principle fully consistent with the ethos of the European Year of Lifelong Learning. Industry is, however, reluctant to have its researchers essentially unavailable for company priorities through secondment to academia, and a long period of uncertainty between constructing an application and being able to start work in the host institute means that commercial priorities, and hence the scope for secondment, are likely to have changed in the meantime. If academic centres able to identify projects expanding a new technology, developing more applied aspects that would be of direct interest to industry, or with particularly attractive scientific working environments for provoking fresh thinking, could win host institute TMR Awards, they are likely to attract considerable interest from industry, even if any one company finds that its earlier priorities in the field have changed.

---

[9] Co-operative Awards in Science & Engineering.

[10] Realising Our Potential Awards.

3.6 An alternative simplification, viz allocating TMR awards to individual fellows with defined projects who would then be free to find an appropriate host institute, is markedly less assured of maintaining the quality of training, and could be cumbersome to operate.

3.7 We do not believe that the TMR Working Group's proposals for shorter training periods will have much impact on industrial participation as host laboratories. Periods of less than six months may not justify the effort required to produce an attractive proposal and gain an award, and the period of productive work at the host institute, after settling-in, would risk becoming minimal. Short-duration secondments of industrial researchers might be better-received, but could only realistically be contemplated if the EC's procedures were drastically streamlined to allow quick decisions to match urgent needs, or if host (academic) institutes were able to apply for a quota of such short-term fellowships within only broadly delineated scientific objectives or to reflect particular training opportunities available in that centre of excellence. Summer Schools and Practical Training Courses offer complementary, but less flexible and customisable, approaches to similar goals.

3.8 Although the recent relaxation that Ph.D. completers can submit their TMR (B30) application if they expect to be awarded their higher degree within three months of the Call for Proposal's closing date is welcome, this remains an obstacle to one of the main groups of geographically mobile and technologically flexible scientists, viz those looking for their first post-doctoral position. Later the need for coherent career progression reduces the likelihood of entering new technological areas, and the realities of family and other responsibilities usually limit geographic mobility. The three month "period of grace" may still fail to align the TMR schedule with the practicalities of the academic year. We recognise the logistical complexities of a more flexible entry criterion in this regard (eg a 12 month period), but believe these can be overcome by making provisional awards conditional on the candidate successfully gaining their expected qualification before taking up the Framework award. Where the candidate fails (itself a rarity at such an advanced stage in a post-graduate course), the funds would simply revert to the next round of applications. This would avoid the difficulties of retaining a reserve list of borderline candidates to whom such funds would later be offered.

3.9 The current Experienced Researcher (B40, or "Visiting Professorship") scheme is attractive, because it provides opportunities for well-established and hence usually influential academics to spend time in industry, thereby directly breaking down the industry-academia gap that the Commission rightly identifies[11] as deleterious to the EU's competitiveness. Moreover, industry can benefit from the expertise, insights and contacts of an experienced academic scientist. Nevertheless, at present, only host laboratories from the Less-Favoured Regions are eligible. This is illogical, given that, almost by definition, many of Europe's most successful industries and companies, by world class criteria, are based in the more technologically advanced Member States. We do not regard such key contributors to European competitiveness and wealth creation as the pharmaceutical and chemical industries as self-sufficient in expertise and experience and so these sectors could also benefit from the B40 option. We therefore recommend that the Less-Favoured Region restriction on host laboratories in the B40 scheme is removed.

3.10 We enthusiastically support the TMR Working Group's suggestion of "triangle" fellowships, involving the candidate, an industrial laboratory and an academic centre (not unlike elements of the UK's Teaching Company Scheme) and we would add an alternative format, viz the candidate, a host institute and their previous institute. The current scope within a TMR research Training Grant for the fellow to spend small amounts of time in a centre other than their host institute is valuable, as it provides opportunities to tackle the research project with the most appropriate methodologies, to import new skills into the host laboratory and to broaden the experience of the fellow. The "triangle" concept would extend this facility to cases where the most appropriate host location for the work is more evenly balanced. We welcome recent operational changes within the FPIV that encourage this type of interaction in TMR applications. The variant that continues to involve the previous institute is not intended to compromise the cross-border mobility of the fellow, but rather to provide a more formal way of using TMR fellowships as a means of developing effective working relationships between R&D centres who might then be better placed to construct and operate a Framework-funded consortium or network under one of the Thematic Programmes. In effect, this would accomplish what is often stated, viz that "people transfer" is the most effective route to "technology transfer", by using TMR fellowships to build closer working relationships between European laboratories, initially within simple, small-scale scientific collaborations. This format need not require the originating institute to be obliged to offer the fellow a return position at the completion of their TMR fellowship. Guidelines could readily be constructed that would prevent this format becoming a means of continuing a candidate's employment in their originating institute, with merely a formality involvement in the (new) host institute, since clearly this would be an abuse and contrary to the intent of the TMR Programme. The "triange" format is an option several SB TMR applicants have wished for, and if would fill a gap between the Training Grants and a full TMR Network.

---

[11] EU Green Paper on Innovation. Chapter 2 (1995); EU White Paper on Education and Training (1996).

3.11 The ability to build on EU-negotiated agreements with other blocs and individual countries is a valuable aspect of Framework Programmes. Since science and technology generally, and particularly those areas likely to make the major future contributions to European wealth and the quality of life of its citizens, are global in nature, we would strongly favour reciprocal access of European and non-European scientists to TMR-like initiatives world-wide. Though this global mobility may appear to challenge the broad objective of selectively promoting European competitiveness, this goal will not, in reality, be achieved by adopting an EU-wide insularity. Rather, the EU's objective must be to create such a powerhouse of innovation and competitive exploitation that the net flow of expertise is inward, and the progressive establishment of integrated EU-wide competences in technological skills, business environments, societal forward-thinking, etc, to create the most attractive locus for the best technological endeavours. This is also consistent with the "holistic" competitive framework envisaged by the EU's Green Paper on Innovation.

June 1996

Examination of Witnesses

PROFESSOR JOHN MCCLELLAND, CBE, DR GREG HARPER, SmithKline Beecham, and DR PHILIP WRIGHT, Technology Group, CBI, called in and examined.

Chairman

143. Professor McClelland, we welcome you and your colleagues to the Committee. Thank you for coming to help us. I do not know, Professor McClelland, if you would like to help us by introducing yourself and your colleagues first?

(*Professor McClelland*) My Lord Chairman, thank you, yes, we would like to do that. First of all let me start with myself. I am chairman of the CBI Technology and Innovation Committee, which is a group of CBI members who focus particularly obviously on technology and innovation and within that remit we spend time particularly on the subject that is under review today. In my industrial background I am vice-president of operations for the Digital Equipment Corporation's personal computer division and prior to that I worked for many years, more than 20 years, for IBM International Business Machines. My background is basically one of having been involved in manufacturing, having managed product development and design activities. On my left is Dr Greg Harper and on my right is Dr Philip Wright, and I will leave them to introduce themselves, my Lord Chairman.

(*Dr Harper*) My Lord Chairman, I am Greg Harper and I work in SmithKline Beecham Pharmaceuticals, a company based in the United Kingdom. I am in the strategic planning group within R and D within that organisation, specifically as Director of Research Policy, and have responsibility for co-ordinating our contributions and participation in Framework Programme IV currently, and my background is in research.

(*Dr Wright*) My Lord Chairman, my responsibility within CBI is as the senior policy adviser who has the responsibility for science, engineering and technology policy. I am actually responsible for co-ordinating the CBI's submission on the Fifth Framework Programme and, indeed, the Fourth Framework Programme.

144. Thank you very much. Did you want to say anything by way of introduction before we launch into questions?

(*Professor McClelland*) Yes, my Lord Chairman, perhaps I may just say a few brief words. First of all, we welcome the opportunity to be here this morning. There are many CBI members who participate in the European Framework Programmes so that the participation level we believe is high in sector terms in information technology, in chemicals, in pharmaceuticals, in aerospace and obviously in engineering. The historical process has been a complex one in coming to today's situation, and not only has it been complex but we believe that at times it has been convoluted. However, we welcome the recent shift of focus towards competitiveness and an output driven environment, and we look to encourage that trend. We believe that there is a clear role for funding research at a European level, but at the same time we would emphasise that that process should be one with clear reasoning and rationale, and in particular we would look to have the prime objective of the activity to be one of underpinning and supporting the competitiveness of European industry. Obviously there are many issues that you will be interested in, my Lord Chairman, and I hope that we can elaborate on that point as we go through the discussion.

145. I am grateful for that, thank you, Professor McClelland. Let me ask the first question, which refers to the role of the Department of Trade and Industry. Would you like to elaborate on how you think the DTI should take a more proactive approach, as I think you would wish them to do, and perhaps you would also say why you stress the importance of the business links in the United Kingdom?

(*Professor McClelland*) Yes, thank you, my Lord Chairman. There are multiple points of contact for the European Framework Programme, the innovation relay centres, the business innovation centres, the Euro-info centres, which are primarily associated with libraries, and we feel that because of that diversity of contacts and communication there is a need for a more focused approach and from that point of view we would expect to see the Department of Trade and Industry take the lead in leading that approach. In particular we feel confident that the Business Links partnerships, the Business Links activities, would provide the opportunity to have that focus not only in general terms but especially in dealing with the needs of SMEs. Therefore, the combination of the need for focus and the opportunity to enhance the communication and the dissemination of the activity and the technology activity for the SMEs would lead us to conclude that

Chairman *contd.*]

the Business Links Programme is an ideal vehicle to have this responsibility.

146. Do you think that all the European Framework Programmes should refer to European competitiveness or do you think that there is a case for having other categories?

(*Professor McClelland*) My Lord Chairman, we feel that the underlying goal should be aimed at competitiveness of industry and support for competitiveness and in that sense we believe it would create the wealth and the economic activity that would support some of the other goals, so we see the opportunity and very clearly perhaps the need to have secondary and tertiary goals, but we would expect that the underlying and primary goal would be of competitiveness and support for competitiveness.

147. You cannot envisage, for example, that there might be a case put forward to improve the quality of life in Europe?

(*Professor McClelland*) We would expect that the quality of life in Europe would be very clearly part of the remit of this activity, my Lord Chairman, but again we would expect it to be a byproduct of the primary goal.

Lord Haskel

148. You spoke about the importance of Business Links?

(*Professor McClelland*) Yes.

149. And you spoke also about the involvement of small and medium sized enterprises?

(*Professor McClelland*) Yes.

150. In your document you advocate consideration of a clear, single point of contact for small and medium sized enterprises under CRAFT, the Co-operative Research Action for Technology?

(*Professor McClelland*) Yes.

151. Do you think that this point of contact should be the Business Links or do you have any other points of contact in mind?

(*Professor McClelland*) My Lord Chairman, we certainly believe that within the United Kingdom the business links activity would be the best and the most appropriate single point of contact. At a European level and within the Commission we feel that it would be appropriate also to find a single point of contact. If I may, my Lord Chairman, I should like to ask Dr Wright to take up that point.

(*Dr Wright*) My Lord Chairman, I think that there are two issues here. First I should like to reinforce what Professor McClelland has just said in as much as if you are interested in coming to try to find out information there is this plethora of sources where information can be found, and it is very difficult for companies to see the wood from the trees, and obviously clearly with the business links initiative I would certainly hope that there is a greater linkage in respect of the provision of information. When it comes down to CRAFT, certainly in the past CRAFT has provided a number of effective or supportive access routes for small companies trying to participate in the European research programmes, and we fully support the objectives of CRAFT. However, I think that the problem with them again is, where do companies get the information from, and I think that there are two levels that we have to think about. First of all there is the national level within the United Kingdom, and again I think that that should be driven through business links; and, secondly, you have the European Union level. Now the problem about the European Union and the current provision of the specific programmes of the Framework Programme is, of course, that they are scattered across the different Directorates General, so the question is, where should SMEs participate at the European level. What I would hope, my Lord Chairman, is that you have a situation where the SME can access a single point of entry into the mechanisms of CRAFT at the European level and that they are then referred on into the specific programmes so that they are not left in a separate ghetto but they are involved in proper programmes themselves.

Lord Gregson

152. My Lord Chairman, this is just a general comment. I am a little bit surprised that the CBI fell for these sorts of European programme quite frankly. There cannot be a more ineffective cost base or a more expensive way of carrying out research than on this sort of basis. These programmes owe a lot more to cohesion than they do to research, do they not? I am surprised at industry—what I see in your papers does not strike me as an effective industrial approach to cost effective research.

(*Professor McClelland*) My Lord Chairman, I will ask Dr Harper to respond to that point.

(*Dr Harper*) With respect to the noble Lord's comment, my Lord Chairman, I think that we can see where it comes from, but the need that industry has, especially the more global industries, is to work with high quality collaborators and partners wherever they may be, and the European Union R and D programme offers another opportunity within a range of opportunities for doing that. I think your point is well made about the emphasis on cohesion and so on, and that is one of the areas that we would wish to see addressed within Framework Programme V, to have a much clearer focus on science and technology and be much less an instrument of social policy.

153. I cannot imagine that your finance director is very enthusiastic, is he, about these expensive research programmes based on collaboration?

(*Dr Harper*) The argument is based purely on scientific quality, and that is what justifies it within my company and those of other companies, I am sure.

Lord Haskel] Perhaps I may move on now to the next point, my Lord Chairman.

Lord Lewis of Newnham

154. Just before we move on, my Lord Chairman, I should like to ask Dr Harper one question. In your particular paper that was submitted separately you do bring home this very important point about the

Lord Lewis of Newnham *contd.*]

globalisation of industry now. What is happening here, of course, is that, as you rightly put it, there is an advantage in going there, but the totality of the advantage must be going on a much broader world basis than this. Would you perhaps like to comment on the restriction that you find with this particular problem?

(*Dr Harper*) I am not sure that it is a restriction, my Lord Chairman. I think that the European Commission understandably has a remit to address the needs of the European Union and phrases many of its documents and politics in those terms, and sometimes perhaps to the detriment of recognising global reality. As I said earlier on, my Lord Chairman, I think that this is one opportunity within a range of opportunities. It is not an exclusive focus that we concentrate on and we would certainly not wish to see the European Union become our sole boundary—clearly we do not. Specifically, there are areas such as partnerships outside the European Union with other collaborative partners and exploitation beyond the European Union boundaries, that is, the geographic boundaries, that yield benefits for European citizens even though they may be undertaken elsewhere, and I think that the European Commission needs to be more cognizant of those realities.

155. But are they aware of it? This seems to me to be the problem, my Lord Chairman. It must be very difficult for an organisation of your particular nature just to say, "We'll only discuss this within the European bounds, we will not discuss it outside them, there must be strict limitations here". How realistic is this?

(*Dr Harper*) I think that the European Commission is aware of that, my Lord Chairman, and their own guidelines for Framework Programme V have acknowledged the need to collaborate with other countries and we see that as a positive point. There are potential obstacles where the dialogue within a company such as a multinational like ourselves inevitably communicates information funded by the European Union beyond Europe's boundaries. That has to be, in order for us to participate as effectively as we can in the science and technology that we are working in. I think that the Commission recognises that reality, but is cognizant of the sensitivity of the point in terms of their constituencies. So we are not excluded, but we are an overtly European based company with headquarters in the United Kingdom. There are companies participating who have their headquarters outside of the European Union and they are allowed to participate, but I think that there is a degree of—well, tension is too strong a word, but there is a degree of slight awkwardness in conceiving projects within a European framework but knowing that many of your key players are multinationals.

Chairman

156. Dr Wright, you wanted to come in?

(*Dr Wright*) My Lord Chairman, yes, thank you, I just wanted to bring up one of the points that has been made by a number of our members, and that is that international co-operation is an essential part of the Framework Programmes. One of the concerns though has been that when there is access by other nations it has to be of a truly reciprocal nature, so that we can participate fully, for instance, in the US programmes and they can participate in the Framework Programmes on equal footing. It must be on a reciprocal basis.

Lord Haskel

157. My Lord Chairman, if I may return to the small and medium sized enterprises and CRAFT, you have said that the critical roles of CRAFT must be to provide a simplified mechanism of access and financial support for small and medium sized enterprises to develop partnerships and proposals, yet in your document you criticise CRAFT programmes for not allowing participation of larger firms. Presumably some of these partnerships that you seek would be between small firms and large firms. Small firms seek partnership with large firms for all sorts of reasons, so how do you reconcile those two things?

(*Dr Wright*) My Lord Chairman, perhaps I can try to explain this. I think that one of the areas that we see as the benefit of the Framework Programmes is because of the internationalisation of supply chains. Increasingly there is movement of supplies across national boundaries within Europe. That is increasingly the case. Certainly I have spoken to a number of our members, my Lord Chairman, and many of our members have relationships with companies throughout Europe. That is very much the case as well with many of our larger members. The role that we see for participation of large companies in assisting smaller companies to access CRAFT is because there is a certain amount of logic of trying to encourage a supply chain view in the exploitation and the development of technologies. Increasingly if you look at the actual flow of technology through businesses, one of the key mechanisms that many of the small and medium sized enterprises are actually adopting it is through the supply chain. It is normally a cascade effect. Increasingly, certainly within the United Kingdom and Europe, there are moves by large companies to work very much with their suppliers in developing and exploiting new technologies, and I think that that is a positive side rather than a negative side.

158. It must be very difficult to limit the supply chain view to Europe?

(*Dr Wright*) Yes, my Lord Chairman, it will be difficult, but I think that that will be judged to have to be one of the more detailed issues for consideration.

Baroness Platt of Writtle

159. I wonder whether you agree with the contention in *Research Fortnight*[1] that Mme Cresson has walked away from industry on the Fifth Framework Programme with her proposal that it should concentrate on social objectives rather than world beating technologies with commercial potential?

---

[1] Vol 2, No 19, 24 July 1996.

Baroness Platt of Writtle *contd.*]

(*Professor McClelland*) My Lord Chairman, we were concerned about the tone of the preliminary guidelines in that context. I think that the preliminary guidelines said that the main priority was research geared towards ordinary people's needs for health care, nutrition and way of life, and although there have been some attempts, I think, to make either corrective or qualifying statements since then, we were concerned about that tone because, if I may go back to my earlier point in my words of introduction, we are obviously strongly supportive of the need to satisfy social objectives, including that of the quality of life, but we feel very strongly in the context of this Framework Programme that supporting and promoting and encouraging competitiveness will lead to that indirectly.

160. Underpin it, you would say?

(*Professor McClelland*) Underpin it, yes, my Lord Chairman.

161. I was not hearing you very well at the beginning. Did you also talk about the environment in your first introductory statement?

(*Professor McClelland*) I did not mention the environment, but I was being brief. I would say that the environment and quality of life and the other social aspects that might benefit indirectly from a programme such as this we feel could be satisfied through the central theme of competitiveness.

Chairman

162. Did you want to add anything, Dr Wright?

(*Dr Wright*) My Lord Chairman, yes, thank you. I just wanted to say that I think that on the environment issue there is a role to play, particularly in actually assisting the dissemination of best practice in environmentally friendly technologies in the manufacturing process. There is a lot that can be done there in spreading best practice across Europe.

Baroness Platt of Writtle

163. In terms of research to produce more environmentally friendly cars and that sort of thing?

(*Professor McClelland*) Yes.

(*Dr Wright*) And also maybe energy use, especially within industry, because, of course, that actually as well directly underpins competitiveness. The efficient use of energy, of course, assists industry in trying to drive down costs.

Lord Phillips of Ellesmere

164. I wonder whether you could expand on your statement that the most important aspect of the Fifth Framework Programme is the need for an embedded process of consultation with European industry and flexibility in the detailed contents of the specific programmes themselves?

(*Dr Harper*) My Lord Chairman, perhaps I may address that one. This is a major area of concern because I think that, in respect of most of the industrial participants in their experience to date of Framework Programmes and their ability to influence how they are designed, and more importantly, given the speed of technology nowadays, how they evolve during their life time, this is a somewhat mysterious process and not very accessible, especially to newcomers. So what we are arguing for here is an overt, well-specified—and this is what we really mean by the term embedded—formalised process whereby key players in the scientific community, be they in industry or elsewhere, can influence the design and the operation of the Framework Programmes as they are put in place in the beginning and as they evolve in response to technological change. One of the specific points that we would raise here, my Lord Chairman, is that the Task Forces have been instigated during the life time of Framework Programme IV, albeit by a process which lacked transparency and has been very partial in its coverage of the relevant areas of science for Europe. However, they were a laudable attempt, and they *are* a laudable attempt, to build the perspectives of the different players, academia, industry and anyone else with a pertinent comment to make, and we would like to see that continue and to be strengthened, that is, strengthened in its coverage of the key players and strengthened in its coverage of the scientific areas that are of importance to Europe, rather than a somewhat bizarre collection as seems to be true of the first choices. However, my Lord Chairman, we should also like to see that process of consultation with those constituencies built into the management of the programmes, because I think that there are risks in divorcing the consultation and the design steps and, if you like, the policy that Framework Programme V should be addressing from the responsibility for implementing and managing the Programmes, and I think that as soon as you have a divide between those two groups, you have the potential weakness that one demands what the other cannot deliver. Therefore, in our document we propose that the Task Force—if that is the name that survives—becomes the senior research board charged with consulting widely and therefore selected in order to be able to do that effectively, but *also* charged with overseeing how the various programmes are run and how their emphasis changes during the life time of the Programme.

165. My Lord Chairman, I wonder whether I could press a little on one or two of the aspects of that. You talk about European industry. We have already discussed the fact that rather few of the large players are any longer specifically solely European, but it also suggests in the word industry that industry is a rather more homogeneous thing than it actually is, and I suppose that that is taken into account in the multiplicity of Task Forces. However, you too, for example, Professor McClelland, and Dr Harper, represent two wings of a rather heterogeneous animal called industry. Do you see any differences within the different sectors that ought to be separately taken into account?

(*Dr Harper*) My Lord Chairman, I think that that is a perfectly valid view and we would not foresee some sort of generic industry representation across a Task Force or all of the Task Forces. I think that the Task Force membership has to be specifically designed with regard to that programme or thematic objective or however the Fifth Framework

Lord Phillips of Ellesmere *contd.*]

Programme is constructed, and that then the membership is selected to best represent, within a reasonably manageable group, the interests of industry and relevant other parties. So I think that it has to be tailored very much to the scientific objectives as to who is on those Task Forces.

166. This is a process which the Industrial Research and Development Advisory Committee, IRDAC, does not really cover adequately in your view?

(*Dr Harper*) I think that the activity of what we are proposing as the Task Force/research board is a more immediate management and supervisory role than the Industrial Research and Development Advisory Committee can give to individual programmes. I think that IRDAC has a viewpoint on the whole of the Fifth Framework Programme which is valid, but it has, of course, a relatively limited membership and I do not think that it would serve the interests of all the participants well if that overarching view of Framework V as a whole became bogged down in the detail of running individual programmes.

(*Dr Wright*) My Lord Chairman, I think that there are two comments that I would really like to draw out of that as well. First of all, the reason that we very much emphasised the need for consultation not just in the run up to the implementation of the Fifth Framework Programme but during its life time is, of course, because of the fact that the actual Framework runs from 1999 to 2004. Clearly things, particularly in the information technology sector, are moving quite rapidly and, of course, sectors do move at different rates, and by ensuring that you do have clear consultation both with industry and with academe this would hopefully allow it to evolve as appropriate in a logical manner. The second point is this, my Lord Chairman, that we have very much emphasised the need to focus, and, indeed, the Commission has perhaps taken that point one step further, the funding of research at the European level. One of the problems that we have with this, I think, is, how will they decide on what areas not to fund, and I think that you have to have a clear consultation mechanism by which you can decide which areas should be targeted and which are the areas that should not be targeted.

Lord Craig of Radley

167. My Lord Chairman, we heard in evidence earlier this morning that there are different Directorates General that get involved, if under one Commission, and when we are asking about certain mechanisms for consultation between the Commission and industry, are you satisfied that the ideas there bring out sufficiently clearly the different responsibilities of the Directorates General within the Commission?

(*Dr Wright*) My Lord Chairman, perhaps I can try to answer that. There are a lot of problems, I think, about where some of these different responsibilities sit, and I think that that also overflows into some of the policy on innovation, for instance, as well, because at the moment you have innovation policy in Directorate General XIII and you have the research policy in Directorate General XII and you have the industry policy in Directorate General III and similarly you have the SME policy in Directorate General XXIII, I think it is, so it is a very complex situation. We have not been prescriptive about how the Commission should manage the Framework Programme in our papers. What we have said is that there need to be clear mechanisms for the actual access to different Framework Programmes and that it must be up to the Commission to manage things in the way that they see as the most appropriate, but clearly there are problems.

168. May I press you a bit further on that point, bearing in mind that there is this plethora of Directorates General. Viewing it from your side of the table in trying to get open consultation and clear understanding who it is that you are dealing with and so on, is that plethora of Directorates General a real hindrance or is it just a bureaucracy with which you are prepared and happy to live?

(*Dr Wright*) It certainly can be a hindrance, my Lord Chairman. I think as well if you look at the evolution of the innovation Green Paper, the response to which is currently being developed by the European Commission, it is difficult to see where prime responsibility lies. Understandably, innovation has to work in all the different Directorates, but I still do not quite see the logic of where the responsibility for innovation lies on the Commission itself. I do not know whether Professor McClelland has anything to say on that also.

(*Dr Harper*) My Lord Chairman, perhaps I may add a detail. One example that I encountered fairly recently was that the Commission are working towards—no decisions have been made, clearly—a unified life sciences programme which is to combine biotechnology, biomedicine and aspects of agriculture and fisheries, and those areas come under different Directorates General, and you can start to see that not only are you combining quite disparate technical areas in terms of forestry and fishing and so on with biotechnology and medical advances, but you can also see the underlying tensions within the Commission officials, that is, the recognition that they are going to have to bridge between something like four or five different Directorates General. I do not think that that is a problem that cannot be overcome, my Lord Chairman; it is no more than a departmental problem in any organisation, and Government is just one example. However, the ideal is that from the perspective of driving on science and technology it should, of course, be as seamless as possible.

Lord Nathan

169. My Lord Chairman, Lord Craig has referred to, and the discussion has just been concerned with, the different aspects of different Directorates General within the Commission, but your emphasis lies, I think—and a great deal of emphasis—on the need for consultation with industry and, of course, you are a great representative of industry, but I do very much wonder what you represent in this respect because it is exactly the same problem, it seems to me, from your point of view as it is from the Commission's

Lord Nathan *contd.*]

point of view, that is to say, amongst you—and we have very distinguished representatives here today—there are multinational companies, some of which are based outside the Community and, you have already referred to it, there are others which are based here but have a very strong multinational activity; then there are the SMEs who have a part to play and there are the large British companies and no doubt there are others that I have not mentioned. It does seem to me that we ought to have some explanation from you as to how you see your obligation as opposed to your view as to how the Community should operate. I would be very interested to hear your view about yourselves.

(*Professor McClelland*) My Lord Chairman, what we have attempted to do is to bring together—and, you are right, there is a wide diversity within the CBI of organisations and of technologies, and Lord Phillips, for example, earlier referred to two of the representatives here today, Dr Harper and myself, and the product cycle in pharmaceuticals, that is, the life cycle of a product once launched, is radically different at the other extreme from the industry that I am involved in, where products may take nine to 12 months to develop and may survive in the market place for only six to nine months. As I say, my Lord Chairman, all that we have attempted to do is to bring together through our committee and through sub-committees the CBI policy aimed at principles which would satisfy in their operation all of the different elements and all of the different aspects that our membership would cover. At the other end of our activity, my Lord Chairman, what we have worked hard at doing is trying to involve our members, and, in fact, they have enthusiastically involved themselves, in committees and in the consultative process and, through task forces which perhaps Dr Wright would comment on, we have participated at the industry or sector level. For us, therefore, it is a combination of bringing together or developing a central policy which, as the noble Lord rightly points out, has to embrace a wide spectrum of activity, economic activity and technical activity, but at the same time we have tried through our members to be very active and very positive participants in those individual programmes.

Lord Gregson

170. Having worked for a short time at ISPRA, which is many years ago now, I am very interested in your statement that the Joint Research Centre institutes should be opened up to market pressures and alternative organisations be allowed to bid for the work. Would you like to expand on that and tell us how you see it should be done?

(*Professor McClelland*) My Lord Chairman, we feel that it is difficult to see the added value of the Joint Research Centre activities, particularly in the context of the level of investment of funding in those organisations, and what we would like to see is that other institutes, networks and technology organisations should be allowed to bid for the work content of the programmes. We believe that wide publicity should be given to this opportunity and that those organisations should be invited and should be given the opportunity to bid on specific projects. To be fair, that process we believe has started, but it is moving very slowly, and we would like to see that particular thrust or initiative significantly accelerated.

171. I am surprised at your restrained language, quite frankly. Would you like to tell us what you really think about it?

(*Professor McClelland*) I apologise for being restrained, my Lord Chairman, but I think that, had we seen no progress, then we would have been much less happy and much less satisfied. We start to see progress; at the same time admittedly we would like to see an acceleration of that.

Chairman

172. Dr Wright, would you like to add anything to that?

(*Dr Wright*) My Lord Chairman, yes, I think that certainly some of our members would have far more severe words to say than we have. There has been a lot of criticism about where the money goes. Clearly we do feel as well - there is a need or a rationale behind having a Joint Research Centre - that only by really publishing and making clear its work programme can the true benefits of any Joint Research Centre or JRC-funded institute be clearly seen, and that is just not the case at the present time.

Lord Craig of Radley

173. Of course, my Lord Chairman, the CBI is not alone in being critical about this particular aspect of the Joint Research Centre, but I should be interested to know whether you have got any concrete evidence that the Joint Research Centre has been failing in the past to the extent that these steps which are now being advocated by you and others are necessary or whether it is just an instinctive feeling, and a reasonable instinctive feeling, that they have not been open to competition and that competition would get better results? Can you help us on that?

(*Dr Harper*) My Lord Chairman, I am not sure that I can address that directly, but perhaps I may make two comments which I think speak in that direction. Of course, the coverage of JRCs of European industry is partial anyway and, in my own area of pharmaceuticals, there is no Joint Research Centre equivalent and yet that is one of the most successful of Europe's industries. Now I am not saying that that is because there is no Joint Research Centre—

Lord Gregson

174. Could be!

(*Dr Harper*)—but their existence is clearly not essential for success. In looking at this, my Lord Chairman, I think that we need to be very cognizant of the concern that many of us share in the relatively low success rates for applications for funding from Framework. One in six is quoted, but it is frequently very much worse than that in certain areas. It strikes me that it is inconsistent to acknowledge or to accept

Lord Gregson *contd.*]

a ringfencing of substantial funds—I think it is, what, 7 per cent of the total budget—for an institute like the JRC, irrespective of the quality of their proposals or whatever. I am not saying that they do not do, in some cases, good science; I am not in a position to judge that because they do not work in an area that I am familiar with. However, I think that the principle of saying, "You will ringfence this area", irrespective of quality, whilst there is tremendous pressure elsewhere is very difficult to defend.

Lord Lewis of Newnham

175. My Lord Chairman, if we were to take those statistics and we put it in, it is not going to increase the strike rate very markedly?

(*Dr Harper*) In terms of sharing out that 7 per cent?

176. You are talking about a one in ten or a one in six, and 7 per cent is not really going to make much difference?

(*Dr Harper*) No, my Lord Chairman, I address rather the principle of ringfencing.

177. Ah, but that is a different question. You were arguing in terms of strike rate, as I understood you?

(*Dr Harper*) No, my Lord Chairman, I am sorry, I was just trying to get across the message that it is not easy to get European Union funding and therefore there is a pressure on ringfencing.

Lord Lewis of Newnham] If I may just follow up with a supplementary on that, my Lord Chairman, does this influence whether you actually make application or not? It certainly would strike me that a small firm must feel very conscious if it is only going to have a one in ten chance of getting something about whether it is worthwhile going through all this bureaucracy in order to obtain this?

Chairman

178. I wonder whether the interests of small firms are best represented by Dr Philip Wright.

(*Professor McClelland*) Yes, my Lord Chairman, Dr Wright may want to comment on behalf of some of our members.

(*Dr Wright*) My Lord Chairman, I think that that is entirely true. I think that there are some problems with respect to a lot of companies seeing it as a waste of time going through the bureaucracy of the system. However, on small and medium sized enterprises, I think that one of the uses of CRAFT has been to fund speculative applications, and I think that, if that is carefully managed, then it is a success and it can actually provide benefit to companies. I think that the bureaucracy issue is somewhat wider, and, if you look at it, I think that it is not only offputting to some small and medium sized enterprises but it can also be offputting to even larger companies, and I think that that is a separate issue that has to be addressed.

(*Professor McClelland*) Perhaps I could add, my Lord Chairman, that the bureaucracy issue is also related to time. Applications are processed very, very slowly, and we believe that this is also a major deterrent to both small companies and large companies, as Dr Wright has said.

Lord Phillips of Ellesmere

179. My Lord Chairman, Dr Harper seemed not to be aware that the Joint Research Centre, as I understand it, has a programme on alternatives to animal experiments. Would that be something that the Joint Research Centre would do under pressure from industry or under pressure from political groups?

(*Dr Harper*) My Lord Chairman, yes, the noble Lord is entirely right to point that out. I think that the pharmaceutical industry is as interested in alternatives to animal work as anyone else, so I do not see that there is a conflict in respect of who is influencing that piece of work. Rather, my Lord Chairman, my comment was really that the influence of the Joint Research Centres as a whole on the pharmaceutical industry is much less than it is in some other sectors.

Baroness Platt of Writtle

180. You have given us a most interesting view from the CBI and I wondered to what extent that view was shared by the Union of Industrial and Employers' Confederations of Europe, UNICE, on a pan European basis?

(*Dr Wright*) Perhaps I may respond to this, my Lord Chairman. I actually sit on the UNICE RTD working group, and I do not know whether you have seen their paper, but I can certainly let you have a copy of it. It is very similar, and we have a very similar objective. If I may just quote from it, my Lord Chairman, one of the key points is that "UNICE supports the view that the Fifth Framework Programme should still be addressed to the improvement of the competitiveness of European industry as a prerequisite to maintaining existing employment in Europe and providing the basis for further employment growth". I think that our view is very similar, my Lord Chairman. There are some detailed differences regarding the relationship of perhaps an evolved role for the Task Forces and whether they should, in their new form (UNICE calls them advisory panels), be kept separate from management boards and how the lines of communication between the two exist. I think that perhaps that is the only area of detail where our two submissions differ.

Lord Butterworth

181. I should like to give you a chance to say something more about your advice in respect of Technology Foresight. In your paper you say that the Green Paper on innovation and certain other papers have made the point that Technology Foresight should be a key area of activity for the Commission. However, you then go on to say that you take the view very strongly that there is no need for a supranational technology foresight exercise organised by the Commission. Now it seems to some of us that Technology Foresight is going to increase in importance and that we are going to hear much more of it. For example, the German President has just set up a piece of machinery in this field in respect of Technology Foresight, but your advice is, what

Lord Butterworth *contd.*]

you say, that the Commission clearly must take account of national foresight programmes. I think that my question is, how. When I leave your paper, I get the idea now that national programmes were throwing balls in the air and you have got probably four or five of them, or you will have. How do you see the Commission getting underneath and acting like a super juggler? What is your advice about Technology Foresight?

(*Professor McClelland*) Thank you, my Lord Chairman, let me try to respond to that question. First of all the CBI is very supportive of Technology Foresight as an essential part of planning the strategic element of any programme, including the Fifth Framework Programme. A point of view is expressed in our document and it was very much associated with the support for Technology Foresight, but candidly we believed and felt the practical recognition that running a European wide Technology Foresight programme was an activity that would be too complex and probably unmanageable. We believe that in the United Kingdom the Technology Foresight programme which many of us participated in was an outstanding piece of work, but in that process I think that we learnt how difficult and complex it is and how long it takes to run a programme of that nature. We feel particularly, given the dynamism of technology and given the industrial and economic environment and the social environment that we find ourselves in, that to run a programme at a European level would be impractical as opposed to being undesirable. The alternative that we saw that answered that concern, my Lord Chairman, and which we also felt added the advantage of recognising perhaps a better approach, was to encourage individual Member States to involve themselves in their own Technology Foresight programmes and then bring those together to reach a European consensus that could be attached to or become part of this Framework Programme. We feel that that is the best alternative, my Lord Chairman, first, from a practical point of view; and, secondly, we feel that it allows also Member States to generate and drive their own vision of what is most important from a technology point of view within their own Member States. We believe that there would be some overlap in those programmes, but that overlap would be perceived centrally, presumably through the Framework Programme, and perhaps the overlap would be the best indicator of those technologies and those activities which should best be focused on by a programme.

182. You see Technology Foresight as an example of subsidiarity, do you?

(*Professor McClelland*) Yes, my Lord Chairman.

(*Dr Harper*) If I may add a brief comment to that, my Lord Chairman, I think that it is important that, in bringing the various national perspectives from their Foresight exercises together, the European Commission does not accept the lowest common denominator that is acceptable to all. I think that there has to be a more enlightened integration of perspectives than merely taking what appears in each report and rejecting the more imaginative ideas that perhaps appear in only one or two of those national reports.

183. If globalisation means anything at all, then you must be right, must you not?

(*Dr Harper*) And I think the experience so far, my Lord Chairman—ESTA has looked at this already for Framework Programme V—was that there was a considerable degree of overlap, especially at the higher level priorities addressed by national foresight exercises. As soon as you get to detail, it becomes less easy to see how the overlap works out. That is partly due to the nomenclature and how the various recommendations are expressed, but I think that, looked at in a more detailed way, it would be seen that many of those areas are perceived in the same way by different national exercises and therefore would be pertinent to Europe.

Chairman

184. I am most grateful to you from the CBI for giving us the benefit of your very great expertise and great help to us. Thank you very much for the patience with which you have answered our questions.

(*Professor McClelland*) Thank you, my Lord Chairman.

Supplementary Memorandum by the Confederation of British Industry (CBI)

During our evidence to the Committee on 13 November 1996, a noble Lord expressed surprise that CBI was supportive of the Framework Programme. Further questioning was concerned with boundaries between national, European and global markets. We would like to re-emphasise three points and provide some additional evidence.

FUNDING RESEARCH IN EUROPE

The CBI believes there is a role for provision of research funding at the European level, but this must be in the context of the global market. Research at the European level should be targeted at European objectives (and not confused with those of individual national objectives). The reason for this is that it is impossible for companies to maintain expertise, or indeed maintain a watch on new and emerging technologies. Therefore companies need to look elsewhere to enlarge the pool of expertise to which they have access. Indeed one of the key characteristics identified in the DTI/CBI report "Innovation: the best practice", is that leading companies are open and seek out ideas from other sources—that is they do not have the "not invented here" syndrome.

Furthermore research collaboration can act as an effective mechanism to initiate the development of strategic partnerships which can assist with accessing new markets or developing a critical and sustainable market share.

CBI/NatWest Innovation Trends Survey

I have attached some figures from this and last year's Innovation Trends Survey. A positive balance denotes an increasing trend in collaboration compared to a negative one, which indicates a decrease.

As you will see from the figures the most significant trends for increasing collaboration outside the UK is with either the EU or the USA.

European v Global

During our evidence it was questioned why focus on European research as opposed to global? We believe that these two approaches are not exclusive. Also many companies do not have the resources to develop and sustain partnerships across the globe. Consequently the Framework Programme can provide a stepping stone to wider sources of technology.

In our evidence we strongly argued for increasing the level of external international collaboration in the Framework Programmes and this should be integrated with the thematic programmes. The consultation mechanism and the projects themselves are the most appropriate mechanism for identifying where collaboration would prove beneficial. Such access should be clearly reciprocal—for example do European companies have reciprocal access to American programmes?

In conclusion, the CBI believes much greater emphasis should be placed upon the outcomes and exploitation routes of Framework Programmes. We do not believe that there is sufficient justification for expansion in the Fifth programme.

Dr Philip Wright
Technology Group
4 December 1996

Trends in international collaboration

Q. WHAT HAVE BEEN/ARE EXPECTED TO BE THE TRENDS, IN REAL TERMS, IN COLLABORATION WITH……?

	Academics/universities			*Other companies*		
	1994	*1995*	*1996 (planned)*	*1994*	*1995*	*1996 (planned)*
Overall	+29	+31	+45	+32	+41	+46
In UK	+30	+30	+43	+22	+35	+36
Other EU	+4	+10	+16	+25	+21	+28
USA	−4	+10	+10	+15	+19	+24
Japan	0	+3	+7	+8	+7	+9
Other Pacific Rim	0	+3	+6	+18	+11	+13
Other countries	+1	+4	+4	+14	+7	+11

TUESDAY 19 NOVEMBER 1996

Present:

Butterworth, L.	Platt of Writtle, B.
Craig of Radley, L.	Porter of Luddenham, L.
Lewis of Newnham, L.	Selborne, E. (Chairman)
Nathan, L.	Soulsby of Swaffham Prior, L.
Phillips of Ellesmere, L.	

Memorandum by The Royal Academy of Engineering

EXECUTIVE SUMMARY

The Academy fully supports the proposal for a Fifth Framework Programme and believes that it should follow the same general form as for the Fourth Framework. It is difficult to be definitive at this stage since the Fourth Framework began only recently and its results have yet to be evaluated.

In particular, Fellows of The Academy have raised the following points:

- The outputs from the Fourth Framework need to be quickly summarised and prioritised, as soon as they become available. There is still a significant need to focus on further streamlining of administrative procedures. A standard system of evaluating Framework activities should be developed and introduced in order to identify the problems encountered in implementing the Programmes and to develop possible solutions.
- The production of a set of stringent criteria for EU research is essential. The main criterion should be a greater cost effectiveness when performed on a European scale rather than a national scale, taking into account the extra time and costs involved in an EU initiative.
- Activities which optimise the dissemination and exploitation of research results should be an integral part of any planned EU programme.
- The Fifth Framework Programme should be repositioned firmly in the area of long-term, pre-competitive R&D.
- Task forces provide the programmes with strategic direction and stimulate new areas of research that demand integration across member states, with particular emphasis on inter-disciplinarity.
- Clear value for money is difficult to quantify and cannot be demonstrated without detailed and extensive studies. Care must be taken that the Programmes are not driven in such a way which makes their outputs easy to measure but which are not in the long-term interests of the EU.
- The European Commission appears to support the Framework Programme successfully, but on-going comparison with the management of similar activities can establish whether adequate expertise is deployed and if appropriate mechanisms all in place. Consideration should be given to benchmarking against leading companies and research councils implementing significant R&D programmes.

1. *What lessons should be derived from the Fourth Framework Programme?*

The principal lesson to be learnt is that there is clearly a significant level of high quality research and development in Europe with an increasing willingness for countries to co-operate trans-nationally. However, the Fourth Framework's outputs need to be summarised and prioritised, tasked and actioned, immediately and quickly.

There is still a significant need to focus on further streamlining of administrative procedures. Whilst the European Commission has a role to monitor and vet the proposals submitted, it must also continue to recognise the need for providing a prompt and efficient service to research and development consortia. There is a general view that many of the procedures that have been introduced make the general administration of Programmes easier for the European Commission but not necessarily for the participating partners. Consideration should be given to employing external professional contractors to manage projects.

An additional problem is the increasing proportion of applications to projects successfully gaining grants. In some Programmes eg the Developing Countries Programme, the success rate is as low as 8 per cent. The concentration of funding (up to 1995, 92.5 per cent of R&D expenditure went to only six member states) is also a cause for concern.

The increasing concentration of research in industry poses potential problems for the continuation of fundamental research activities, for the continued participation of some universities and research institutes and for the participation of some regions. The European Commission should introduce a standard system of evaluation of Framework activities in order to identify the problems encountered in implementing the Programmes and develop possible solutions.

2. *Should there be a Fifth Framework Programme? If so, what should be the main objectives or focus and how should the priorities be set?*

The Academy believes that there should be a Fifth Framework Programme and that it should follow the same general technical form as for the Fourth Framework. It is difficult to be definitive at this stage, since the Fourth Framework began only recently, in 1994, and its results have yet to be established and evaluated.

The production of a set of stringent criteria for EU research is essential. The main criterion should be a greater cost effectiveness when performed on a European scale rather than on a national scale, taking into account the extra time and costs involved in an EU initiative. A group of national representatives could be formed to sponsor the research programmes on behalf of the member countries funding the research. Representatives might comprise people from Government, industry and academe and involve businessmen as well as scientists (an extension of the Technology Foresight philosophy.)

Investment in research is primarily the responsibility of industry although it is important that governments stimulate the generation of science and technology. There is scope for EU co-ordination of the funding of large scale demonstration plants and global research programmes, perhaps in collaboration with the USA and Japan. There is agreement that European level research and technological development activities should add value to the efforts of the member states but the question of how this criterion is assessed and by whom has arisen.

Activities which optimise the dissemination and exploitation of research results should be an integral part of any planned EU programme.

The programmes should concentrate on major strategic interests defined by industry and government in consultation with academe. As with Technology Foresight these should include wealth creation and quality of life objectives which need tackling on an EU basis. In order to clarify the objectives, each programme definition should begin with the reason for its proposal eg societal needs. Means of achieving the goal should be outlined in terms of science and technology to attract those researchers most able to provide solutions.

Broader programme themes would be an improvement. Individual researchers could then be invited to outline possible projects which would ideally be screened by representatives from all member states.

3. *What should be the balance between basic and applied, pre-competitive and near-market research funded through a Fifth Framework Programme?*

The Fifth Framework Programme should be repositioned firmly in the area of long-term, pre-competitive R&D. The Fourth Framework Programmes have moved too far into the near market area with the emphasis being on service and application solutions which are often far too close to the competitive area. The lack of long term R&D in programmes could jeopardise European industry's long-term future by encouraging short-term exploitation without the balancing requirement of 'seed corn' research. It is vital that all European industries adopt a balanced approach to their R&D and the European Union's role should be to encourage collaboration in the long-term aspects of that balance. Some large companies are unwilling to participate in near market R&D which may compromise their commercial position. The benefit to Europe of collaboration can be maximised if programmes encourage all participants to be involved at the formulative state. Whilst Fifth Framework should move back to the pre-competitive arena, it should nonetheless remain clearly focused towards the needs of the market and users for long-term R&D. This is something the Fourth Framework has emphasised and should be encouraged.

4. *What should be the role of task forces in the Fifth Framework Programme?*

Task forces should provide strategic direction to the programmes and stimulate new areas of research that demand integration across member states, with particular emphasis on inter-disciplinarity. The Task Forces should be able to commission and direct work—not respond to open bidding. A decision that they would not get their own budget under Framework V but would work through specific programmes, would be welcomed.

5. *Can it be demonstrated that the UK gets clear value for money from participation in the Framework Programme and, in particular, what has been the impact on industrial competitiveness, social and economic sectors?*

Participation in past Framework Programmes has provided the UK with a range of benefits which include the sharing of costs, the establishment of standards, access to R&D results from European projects, the development of European contacts and an increased understanding of the latest developments and methodologies in Europe. These all serve to increase the competitiveness of UK companies and universities in Europe, and to provide a pool of expertise to support UK industry.

Framework Programmes are essential in providing long-term pre-competitive R&D, without which there can be no near market R&D in new fields. The Programmes act as a useful flywheel to ensure that projects are pursued long enough for results to be possible. They also provide a useful source of funding for University and industry collaborative projects, fostering international technical co-operation and increasing UK familiarity with wider markets.

Clear value for money is difficult to quantify and cannot be demonstrated without detailed and extensive studies. Care must be taken that the Programmes are not driven in such a way which makes their outputs easy to measure but which are not in the long-term interests of the EU. The Programmes should continue to address those areas which cannot effectively be addressed at national level or by individual organisations without further public support. One criterion for future appraisal of a project should be an indication that project costs would be lower than if attempted on a national level.

Results must be disseminated to the appropriate Institutions and bodies in both technical and financial benefit terms.

One concern which has been highlighted is that the contribution made from 'public' funds through the low level of contribution to University indirect costs, may not have been taken into account when considering the full cost of the Framework Programmes. One example cited in a university is that the full indirect cost recovery rate, as audited by Government departments, is in excess of 80 per cent of salaries and, therefore each programme effectively carries with it further subsidy from UK funds.

6. *What should be the role and priorities of the Joint Research Centre, and how should its activities be funded?*

The Joint Research Centre provides scientific and technical support for EU policies and thus part of its work should be funded directly from the policy directorates. The remainder of JRC work should compromise those items with particularly large critical mass such as fusion research and nuclear safety. The Joint Research Centre should be concerned with those technologies for which there is a clear technical case but for which the means for achieving the technical end results are not yet established. Selected items should be funded from research programmes to encourage the JRC to be competitive with other research establishments.

The JRC should have a coordinating role but also, in certain areas should have the capability of undertaking longer term research which is unlikely to be dealt with in universities or industry. Although it is no doubt healthy that the JRC should raise some money through contracts, this should not be carried too far as it will erode its capabilities and convert it simply into another competitor for available funds.

There is concern among Fellows of The Academy at the apparent low profile of the JRC. European Institutions should be able to demonstrate that it is achieving work which cannot be undertaken by other existing mechanisms. On a value for money basis there is some doubt that the JRC is competitive for sponsoring research within the EU.

7. *How should the EU meets its 'cohesion objective' of enabling SMEs and Member States with less scientific expertise to benefit from the Framework Programme, while ensuring that the highest scientific standards for EU research are met?*

The Framework Programme should pursue its objectives in the most cost effective way and only high quality R&D should be funded by the Programmes. Direct involvement of SMEs in all sectors should not necessarily be sought but appropriate mechanisms for the dissemination of results should be found. Special schemes for SMEs do not appear to work very well. The industrial competitiveness of the UK and European Union primarily depends on large companies. If they are world leaders then SMEs gain from subcontracts and from supplying them.

Low quality research and development should not be funded within the Framework. Investing in R&D in countries with low levels of scientific expertise is unlikely to yield benefits in the long term. It is appropriate to attempt to raise the standard of scientific expertise generally but this should be done either through an EU initiative such as the European Regional Development Fund or through a clearly identified budget, separate from the budget used to fund research. Separate funding to improve the research infrastructure of the less developed member states could prove a useful investment for the EU in the medium to long term.

8. *Does the European Commission have the adequate expertise and mechanisms to support the Framework Programme?*

The European Commission appears to support the Framework Programme successfully but only on-going comparison with the management of similar activities can establish whether adequate expertise is deployed and if appropriate mechanisms are in place. Consideration should be given to benchmarking against leading companies and national research councils implementing significant R & D programmes.

There is concern that the European Commission is under considerable pressure given the size of the budget which it administers. In some recent projects attempts have been made to pass on the management to academics and others, often apparently without adequate funding or briefing about the workload involved. This matter needs more careful consideration.

9. *Is the current length of the Framework Programmes too long and would they benefit from shorter time frames with more flexible funding? Alternatively, should the programmes be longer?*

The current length of the Framework Programme is about right and has the advantage over a continuously rolling programme that it allows for step changes at sensible intervals in what is a very wide-ranging activity. However, more flexibility is needed in determining the duration of individual projects within specific Programmes. Projects should aim to complete their objectives in the most cost effective way, which will not necessarily be over the full duration of the Programme.

10. *Should task forces have ear-marked funds to support their own research programmes?*

Fellows of The Academy are divided on this issue. It is clear however, that the European Commission must avoid a situation where alternative controllers of funding exist for the same subject area.

11. *How should the UK allocate funding for the Framework Programme and other EU research initiatives to ensure that UK researchers are not disadvantaged?*

The UK should ensure that any increases in funding of EU projects do not trigger corresponding decreases in direct UK funding of R & D. UK researchers should be encouraged to participate in EU projects with the aim of capitalising on our science base to the extent of generating a net inflow of funds. The UK should also consider allocating additional funds to supplement those received by the European Commission in order to ensure properly resourced research actitivites. Government should actively encourage industry involvement and some projects should be funded 50 per cent/50 per cent Government: Industry to the maximum level allowed in the EU for equal status within the Framework.

Examination of Witnesses

PROFESSOR S F BROWN, FEng, Professor of Civil Engineering, University of Nottingham, MR M J NEALE OBE FEng, Consulting Engineer, and DR D A PARKER FEng, Formerly Managing Director, T&N Technology Limited, Royal Academy of Engineering, called in and examined.

Chairman

185. Good morning, Professor Brown, Dr Parker and Mr Neale. I do not know whether, Professor Brown, you would like to introduce yourself and your team?

(*Professor Brown*) Indeed, my Lord Chairman, thank you for giving me the opportunity. Greetings to you on a dirty morning. My name, as you know, is Stephen Brown, I am a Professor of Civil Engineering at the University of Nottingham where I am currently in the middle of a four year term as Pro Vice-Chancellor with responsibility for research and our links with industry and commerce. I am also a director of a small consulting engineering firm which is a spin-off from my research activities at the university. If I could introduce my two colleagues. On my right, Dr Alec Parker, who is a consulting engineer, former managing director of T&N Technology Limited. He is a mechanical engineer, a Fellow of the Institute of Physics, and currently a visiting professor at the University of Bath. On my left, Michael Neale, former past president of the Institution of Mechanical Engineers who runs a mechanical engineering consultancy firm. My Lord Chairman, the paperwork that was submitted by the Royal Academy, as you will understand, is a compilation of various views that were submitted to the staff from a number of fellows and organisations but we are, as you will understand, an organisation of individuals. Therefore, in giving evidence to you we will endeavour to get across the consensus view of the Royal Academy as it has been presented in this evidence and obviously we will be happy to answer any questions you have on this. There may well be occasions when there might be some slight differences of view perhaps because we come from different perspectives, but that might well enrich our debate. I think that really the other thing I would say by way of introduction, if I may, is that in principle the Royal Academy strongly supports the concept of a Fifth Framework Programme and, as we have said in the opening paragraph of our submission to you, we feel it might follow broadly the same agenda as the Fourth Framework but this is an area obviously

Chairman *contd.*]

for discussion and there will be differences of view about that. We have some difficulty, like everyone else I suspect, in assessing whether the Fourth Framework has been an enormous success or not because we are still in the midst of actually doing the research. I am personally involved with a BRITE EURAM project which is only half way through at this stage. We are supportive of the Fifth Framework and we would be happy to discuss our ambitions and thoughts that we have about it and indeed about the Framework in general.

186. Thank you, Professor Brown. Thank you to you and your colleagues for the helpful written evidence that you have submitted, we are very grateful. I am going to start by asking if you might refer specifically looking backwards to the previous Framework Programmes and whether you would like to give us your views to what extent these have contributed to engineering research?

(*Professor Brown*) Perhaps I could begin by making a few comments and then ask my colleagues to give their views from their perspectives. Broadly we have welcomed the opportunity, I think those of us working in research within universities and those of us in industry, that the Fourth Framework and indeed the earlier Frameworks have provided for us to work with other players in the European Union, both within research establishments on the continent, as it were, and also working with other companies. This has enriched the research that we have been able to undertake. It has allowed us to do things that probably we would not have been able to do had the Framework not existed. I think we have found that this has been helpful. It has been helpful in a number of ways, both specific to do with discoveries and development of technology but it has also been helpful in terms of getting to know one's fellow Europeans. That certainly has enriched our view of the work we do and the nature of the work that we have done.

(*Mr Neale*) I would support that and say that one of the advantages has really been in establishing contacts with other people, other industrial companies, other universities, with a view to getting a wider range of experience and view. As far as the actual results are concerned, I do not think I can comment in detail other than to say that in general if one produces some new engineering research results these are bound to provide a useful pool of information. I think the main advantage is what you might call the networking advantage and the width of experience that gets brought in from this wider field.

(*Dr Parker*) I think the long-term aspect is very important. Having been an industrialist I have welcomed what I have chosen to call the flywheel effect of programmes such as this which enable a long-term programme to be continued to completion. This is very important because without the long-term work there can be no near-term work and hence no long-term gain. I support what my colleagues have said about contacts although to someone from an industrial group working across the world contacts are not new, so I would not emphasise that. There has been a whole range of individual technical benefits. Quite clearly in the information technology area there have been very considerable advances and these have resulted both in products and in better ways of doing things within the business. I have also been involved personally with ceramics programmes and I am greatly encouraged by work on high temperature super conductors. Work on more efficient use of energy, better use of fossil fuels, reduction of pollution and energy savings are also most encouraging, as is work on electric vehicles, improbable though they may be, in terms of better batteries, fuel cells and that kind of thing. I fully support my colleagues in urging a further programme along these general lines.

187. But, Professor Brown, let me just put this to you. You have drawn attention to some excellent collaborative work in Europe, that I think we can take as given, we can also accept in your written evidence you say that we need greater cost-effectiveness. You and everyone else who has given written evidence has drawn attention to some shortcomings in the management of Framework Programmes in the past, bureaucratic and not necessarily well managed, in fact invariably poorly managed is the view. Why is it that we need the European Framework Programme to have European collaboration? Are there other models that you are familiar with, such as EUREKA, which deploy national resources but which nevertheless may be more cost-effective than this rather complicated procedure of paying into a pool in the centre, top slicing for a bureaucracy which we think is inappropriate, and then redistributing the net assets? Would you comment on that, please?

(*Mr Neale*) As I alluded in my opening remarks, assessing whether or not the Framework Programmes have been cost-effective is difficult because we are still a bit too close to the research that is going on in terms of what might spin off into industry to make Europe become more competitive. It has become somewhat less competitive, I gather, in international comparisons in recent years. It is bureaucratic and we are concerned about that. I think my view would be that we should try and persuade the powers that be in Brussels that they should address some of these elements to recognise that there are substantial benefits from us working together on research projects between countries in Europe collectively, in collaboration, and to see if we cannot rather than throw the baby out with the bath water try and address the efficiencies or lack of efficiencies in the system as we perceive them. We have some comments that we can make about this, at least from the perspective of the university, and I am sure my colleagues can add from the perspective of companies.

Lord Porter of Luddenham

188. I imagine as engineers I can guess what your reply will be to this question, or at least partially. You know, of course, that the Commission has indicated that Framework V is going to be more in the direction of social objectives than the sort of thing Dr Parker has just been talking about—his examples have been good in the past—and less in support of world beating technologies with commercial potential. What is your opinion on that?

Lord Porter of Luddenham *contd.*]

(*Professor Brown*) Perhaps again I could begin. We think it important that the consequences of our research endeavours should be looked at in the social context of Europe and there are going to be questions of moral issues that are going to arise in connection perhaps with some of our biomedical research which incidentally I think the universities are well placed to take an independent view on relative to industry. Working in collaboration with our friends in industry we might get a balanced view about some of these ethical issues. Certainly the Royal Academy, and I think we represent their views here, whilst recognising the social dimension, the importance of the social dimension, very much would emphasise the greater importance in our view, in anticipation of your opening remark, Lord Porter, of concentrating on high level science and technology in this Programme but doing it within the context of the social needs, quality of life, and all sorts of phraseology that we are familiar with which form the umbrella within which we are operating.

189. You mentioned ethics, and I can see the place of those, but would you put them among the social issues that have been talked about here or are they something different which obviously all of us must look at?

(*Professor Brown*) I think they are strongly linked because whether or not we implement particular technology to do with the quality of life will have social consequences.

190. I was talking about the ethical as distinct from the social.

(*Professor Brown*) One has to resolve the ethical issues prior to implementing perhaps certain technology. I am thinking of things like genetic engineering. Could I perhaps add an observation we have made which I am sure will be familiar to your Lordships, that the Commissioners who have been, as it were, in charge for the Third, Fourth and the upcoming Fifth Frameworks have had particular backgrounds which seem to us to have had a very strong influence on the flavour of the research and technology that has developed within that Framework. In Framework III we had someone with an academic background and there was quite a strong academic flavour to that, that was Fasella. Ruberti in Framework IV had a background in industry and there has been a stronger move towards industrial application and industrial involvement in Framework IV. Edith Cresson, who is the Commissioner to be responsible for Framework V, has a political background and is more interested in the social dimension, hence presumably your question, but it seems to us that a Commissioner has a view on these things which tends to override perhaps some of the evidence that comes forward from organisations like ourselves which might be unfortunate.

Lord Lewis of Newnham

191. I would agree with you totally because after all it is said that a child is father unto the man, so I suppose in these circumstances our past prejudices are bound to show through. From the point of view of Framework V, how far do you feel there ought to be any carry-ons from the previous Programmes? In other words, do you think that in a given programme there ought to be a complete closed box, as it were, or do you think there are opportunities, desirable opportunities, for this to extend to other programmes? The difficulty is you cannot continue doing the same thing all the time.

(*Dr Parker*) I think it very much depends upon the outcome of the Framework IV. One of the hardest things to do in research is to close down a project. This is what we have to do in some of the long-term areas of IV if we are able to open up new areas in Framework V. I think there needs to be very careful review at the end of each Framework Programme, before the end really, to decide which long-term objectives are so good they must continue and which are rather dubious and should be axed and give way to better. Could I just come back on the previous question, my Lord Chairman. Really I do not think that one should go entirely for the social dimension. Neither do I think one should go back to the entirely technical dimension. What I would advocate is go for the world beating technologies with commercial potential but anticipate success by setting aside funds for the solution of the consequent social problems which there will inevitably be. By that I mean create a breathing space for retraining and upgrading of people displaced by this superior technology. I think that is a humane but nevertheless a good technical approach.

Chairman

192. Do you want to come in, Mr Neale?

(*Mr Neale*) I would just like to make a couple of points. One is that I am sure that one way of overcoming some of the social problems in fact is to raise the general level of wealth in the community and one essential way of doing that is by a technological development, so if one can do that that is a very good thing. I also think that in terms of Europe the complication and interaction in technological development does require a fairly broad field of work whereas I think some of the social subjects could probably be studied from a national base. I think essentially the technology is complex—I am not saying that social problems are not—and there is a major point there. Just finally on the other one, I agree entirely with what Alec says, what we need is to have a means of assessing at the end of each Programme how successful it has been to decide how much of that we should carry on.

Lord Nathan

193. Turning to the points discussed in the context of energy, how far would you say that the development of energy resources should be considered in the context of the social and environmental consequences because that would govern the direction in which your research was to proceed? On the other hand, if you decide to go for very high tech new developments in the energy field without regard to them then you find those factors are really an add-on which may not fit very comfortably.

Lord Nathan *contd.*]

(*Mr Neale*) I think we would agree with you that it is essential in determining what to do in a research programme but you take into account the possible social effects. I think that is important, certainly in energy and things like whether to go for wind or coal or whatever. I think in terms of actually doing the work I feel that doing this on a European basis for technological investigations is perhaps more appropriate than it is for spending the time on social investigations.

(*Dr Parker*) I think Lord Nathan has chosen a very interesting area in mentioning energy because there is, of course, a huge social dimension to advances in energy. I speak of gaseous and particulate pollution, not just from motor vehicles but from power stations and so forth. Quite clearly that element of the social aspect has to be built into any research programme from the start.

Lord Butterworth

194. Going back, if I may, to this analysis of the different Framework Programmes, you deal with this in your paper at paragraph three where you point out that what you would like to see in the Fifth Framework Programme is a return to the area of long-term pre-competitive research, which of course we understand. You say: "The Fourth Framework Programmes have moved too far into the near market area . . . ." But then towards the end of that paragraph, having said that the Fifth Framework Programme should move back to the pre-competitive area, you then go on, somewhat surprisingly, to say: ". . it should nonetheless remain clearly focused towards the needs of the market . . ." I wonder if you could help me by analysing this further. If you are wishing to see the Fifth Programme become more competitive, presumably more basic, how can it at the same time be firmly focused on the needs of the market?

(*Professor Brown*) My Lord Chairman, I do not think these statements are entirely inconsistent. Perhaps I can say in introducing our comments to this that there may well be some slight differences of flavour in the results that come here because I represent a university that of course is principally interested in the fundamental end of research but also is very interested in seeing the results of our research endeavours helping UK PLC, or Europe PLC perhaps in the context of the discussion this morning. I think also these two comments are consistent with the approach we are adopting in this country following the White Paper on Science, Engineering and Technology where through our research councils we are required, even when we are putting up proposals for fundamental work in physics or chemistry, to try and identify a potential user. If you like it is technology foresight, we are looking to the marketplace but we may be looking some way down the road towards the marketplace. The reason why we think we like the pre-competitive area, those of us who follow this philosophy and I think this is probably a majority view in the Royal Academy but my colleagues will speak for themselves, is that it is in this environment that you will get the best collaboration between companies who otherwise if you get too near market are in the competitive situation and are not prepared to share information and with universities who can provide, as it were, the fundamental end of the portfolio of research in a project. Industry can tap those bright ideas, can tell the academics where the ideas may not work perhaps and you get quite a nice balance. If you get too near the market I think you start to get into some difficult areas in terms of value for money. My own experience of working, for instance, on LINK programmes in the United Kingdom, which follow the same philosophy as being pre-competitive, supports this. I have recently completed a programme where I had nine companies working together with me on materials for highway engineering. If we had been too near market these competitors, many of them major oil companies, would not have agreed to work together.

195. I wonder if I could invite you to get at it from a slightly different way. The Royal Society has said that most scientific research is sponsored nationally and should remain so unless there is a clear scientific or economic benefit in doing it from the point of view of Europe. What about the research that is being undertaken in the United Kingdom in engineering? Is not the emphasis there already very much on the basic, the scientific, the long-term? I am asking you, but I am only a lawyer, may it not be that what is wanted is some kind of focus upon the market?

(*Professor Brown*) Let me try and respond to that and then I will let my colleagues have a turn on this one because it seems to me to be quite important. I think in the United Kingdom we have got quite a good balance between fundamental work, blue skies research if you like, being carried on at university, even in the post-White Paper era although it is terribly important for us to try and preserve that because tomorrow's pre-competitive and competitive applications come from today's blue skies research looking ahead. There are lots of very good examples. I can think of a couple in my own university immediately where many years of good fundamental research funded by research councils has eventually moved to the marketplace, such as the genetically engineered tomato that my colleagues in our food science group brought to the marketplace and magnetic resonance imaging, for instance, which was invented by Sir Peter Mansfield at Nottingham which started with fundamental research that led through eventually to the marketplace. I think we must preserve this blend. I think we have had it reasonably in leading universities in this country. Moving then to the European dimension: I have more difficulty in forming a firm view as to whether we try and mirror that same approach but the European dimension allows us access, for instance, to facilities that we may not have here, things that we cannot do within the United Kingdom that we can do working with European friends which would have a blend of fundamental and more applied research. Let me turn to my colleagues and let them have a go at this one.

(*Mr Neale*) My personal view on this perhaps is a little divergent from the broad area. I am of the view that while we do know that there is a number of fundamental new developments, such as the

Lord Butterworth *contd.*]

examples Professor Brown has given us, which lead to a new development I am definitely of the opinion that a very large number, in fact the majority, of useful developments in terms of industry arise from recognition of the problems and opportunities in areas of technology and seeing how problems can be solved to produce a major step forward in those technologies. Therefore, my feeling is one does want this link between the industrial area and the fundamentals but the way that you do it is you analyse what the problems and opportunities are in a particular area of technology and from that you can distil the necessary fundamental investigations which need to be done. In other words, industry has a mechanism for guiding the academics in doing something really quite useful rather than relying upon them to produce ideas out of the air in the hope that one in one hundred of those will result in something useful. There is definitely a mechanism for linking back from industry and its technology, its problems and opportunities, into the really fundamental work that needs to be done to solve those problems. I see a link. I am in favour of the focus being towards industry but I see that giving rise to some very useful fundamental investigations.

Lord Phillips of Ellesmere

196. I wonder whether it is not important to distinguish between different sorts of industry in this kind of debate. For example, in the remarks that have been made in response to recent questions it seems to me that they applied mostly to engineering based industry and the mechanical civil engineering sectors. The Academy is also concerned with biotechnology and bioengineering and there the gap between, say, the pharmaceutical industry and the chemical industry and basic research is much less clear than it is between other elements of engineering. What have you got to say to that side of the industry?

(*Dr Parker*) I have some difficulty in speaking about the pharmaceutical and chemical industries, save to say that they are very successful and they spend very large sums in the hope of one day getting a winner. Somebody stopped one of my main board directors in the street and said "Where is your Zantac?" The answer is we, in a more mundane business, move in a series of small steps, relatively small improvements, across a broad front whereas the pharmaceutical industries need to have a big advance every now and then. From that point of view you are quite right, my Lord, the structure of the research is very different. In ours there is a greater emphasis on what we would call the near-term work.

197. I think it is true to say, my Lord Chairman, that the kind of work that you see going on in an academic laboratory in the chemical/pharmaceutical areas looks very similar to the sort of work that you would find going on in an industrial laboratory?

(*Dr Parker*) Yes.

198. Whereas in engineering and physics the same is not the case.

(*Dr Parker*) The same is not true, there is a big difference. I would just like to say that I think there is no conflict of interest between things being fundamental and things being focused. If I may explain that. If I may talk about engine friction. If one wants to understand how to make a better component it may be a very good starting point to begin a fundamental investigation into the nature of engine friction. That will match up with anybody's academic standards. One actually needs a programme like that in order to make advances at the much more detailed level. So we can have our Framework Programmes doing that and then when they are done there can be near market efforts by the companies concerned in those areas. On the question of why go to Europe for such things: such a programme would of course involve not just what remains of the United Kingdom industry but Fiat, Mercedes-Benz, Volkswagen, the very best of Europe, and those brains would be brought alongside our own in achieving the fundamental results upon which our near-term work would be based. In that area there is a clear advantage.

199. Could I press that just one step further. I wonder whether you think there may be a need for different kinds of programmes which are suited to the differences between the different sectors of industry which you agree exist?

(*Dr Parker*) I am sure that is right.

(*Mr Neale*) I could add a point to what you have said. There is quite a fundamental difference between the linkage between research and application in mechanical engineering and in the pharmaceutical industry. If you look at the design of an engineering machine and take a simple component like a bearing, for example, which supports a rotating shaft, you find that you need about 70 what one might call knowledge elements, which are the equivalent of a PhD thesis, to be put together to give you the jigsaw which is the design method for producing that component. That is in mechanical engineering. In the pharmaceutical industry fundamentally you are dealing with the formula of a drug and the effect that has on different animals or people or the environment and the number of knowledge elements involved is very much smaller, we are talking about three, four or five, and therefore the linkage process is much more straight forward. This is one of the reasons why you will find that the research activity going on in a university lab is not that far different from what is happening in industry.

Lord Phillips of Ellesmere] I think we might disagree about the number of knowledge elements!

Lord Soulsby of Swaffham Prior

200. I am glad that last comment was made! Can I go back to something that Professor Brown said, that there are things that cannot be done nationally but can be done on a European basis. Can you give some examples and the reason for this? Is it because of the amount of finance available in Europe? Is it because of the expertise or facilities or all of these together? I am wondering about things that can be done in Europe that cannot be done nationally.

(*Professor Brown*) One of them has been identified in a number of the documents that have been written about European research and that is making use of large scale facilities to which we contribute as a nation. I think the other is more difficult to be precise

Lord Soulsby of Swaffham Prior *contd.*]

about but my own experience is that by working with people, in my field at least, and groups from research establishments and industry within continental Europe you are blending your ideas with folk who come from different backgrounds and they will introduce, if you like, a different way of tackling a problem. The French tend to approach things rather differently from the British, perhaps a more fundamental approach often in engineering than we might sometimes take. I think it is in these somewhat intractable areas that one gets major benefit from that you would not get with a similar consortium of industry and university within the United Kingdom, all of whom have been brought up at Oxford, Cambridge, Imperial College or Nottingham, if you like, in terms of their basic training. I think when I said earlier that working in Europe enriches our research I think I meant that we are working with people with different backgrounds both in terms of their education and research training as well as the way in which they view the world through the industrial company.

201. I would certainly agree from the point of view of enrichment, absolutely. I am wondering were there to be sufficient funding for research in this country across the board many of these things that you are talking about could be done and would be done in collaboration with people in other countries. It is the fact that funding is available in Framework Programmes that drives British research workers at all levels and the universities to go there for additional funding and, of course, what you are saying is a spin-off of that, that the initial motive is to go where there is funding for research.

(*Professor Brown*) Indeed. We are following the marketplace. Universities are research contractors these days. We are looking for research opportunities and companies are also looking for opportunities for sharing the cost of their R&D. If there are sources of funds available in Brussels that have been established as a result of political decisions then that is where we will go to get the money. You are quite right, if we started with a blank sheet of paper we could invent a very good scheme perhaps funded here which would allow us to bring in appropriate European partners to enrich our research in the way that I described earlier.

Lord Craig of Radley

202. Perhaps we could follow up, as we have got on to the subject of funding, by addressing for a moment who is best placed to allocate funds, particularly to improve competitiveness and to encourage innovation. It has been suggested that some arrangement for corporate R&D perhaps helped by tax credits would be a better way of improving innovation and competitiveness than relying, as we are in these programmes, on funds mediated by the Commission. It is clearly a very broad subject, but I would be grateful if you could point us in the right direction.

(*Professor Brown*) There is not a unanimity of view within the Royal Academy. Michael, would you perhaps like to start off on this one?

(*Mr Neale*) Yes. My feeling is very much that to provide a tax credit to industry to encourage them to do their own R&D would in fact be a very effective process because I am sure that there are a lot of problems waiting to be solved. A lot of this does not happen because of financial restraint and I think it would be a major encouragement, and I personally would think it would be a very good use of funds to do that.

203. Do you think that that would help in what one is inclined to call the "blue skies" type of research or would it become too focused on practical more close to the marketplace research?

(*Mr Neale*) No, because I think once you identify that you are going to do some development of this sort in industry you can extract from that what the key things are that you want done in a university to carry out the fundamental investigation which fills the gap in your understanding of that particular problem. I would think that there is every chance that it would actually encourage really useful work to be done in universities because of that origin of funding for them.

(*Dr Parker*) I have complete sympathy with this idea of near-term work. I think that would be very effectively dealt with in this way by a tax credit. Practical experience teaches me that as far as the longer-term work is concerned industry would be rather reluctant to do it. It would rather concentrate its limited resources on more immediate commercial objectives. From that point of view, I would really like to see that funded by a programme such as a Framework Programme, otherwise it will not happen.

(*Professor Brown*) The only point I would make perhaps in support of the tax credit argument is that this could conceivably be helpful for SMEs. This is, of course, one of the objectives of the Framework Programme, to try and help smaller companies to get involved in R&D which they could not otherwise afford to do, but I would be concerned if there was too much movement in this direction in that it would detract from long-term research in universities.

Lord Lewis of Newnham

204. Professor Brown has brought up the concept of SMEs. How far are they participating in these particular programmes? We have seen examples in other areas where it has been the bigger firms which have clearly moved in, but, as you rightly point out, one of the objectives of this particular programme indeed was to try and enthuse the SMEs. Has that been successful?

(*Professor Brown*) I do not think it has been terribly successful.

(*Mr Neale*) I am a Chairman of an SME, effectively, and I have tried on two or three occasions to get involved in these programmes. The amount of work you have to put in in order to link up with the other European companies and universities is so large that if you do not succeed within the first two or three attempts you are inclined to give up and say, "No, this is too much effort."

205. So is that a reflection on the success rate for applications within these programmes?

Lord Lewis of Newnham *contd.*]

(*Mr Neale*) I think it is. If there were some measure for filtering the possibility of success before you have to make all this tremendous investment in flying around Europe liaising and so on then I am sure that this would be a major step forward.

(*Professor Brown*) I am sure that is right. I strongly support that view. Under the current administrative arrangements you only have the opportunity of putting in a full proposal, which is very expensive in staff time and in expense. This puts off a lot of small companies and it puts off a lot of universities, I have to say. We would very much favour the idea of pre-submissions of brief outline proposals with the teams outlined. These could be screened by the Commission committees prior to a rather more limited number of people going forward, very much as we do with our Link programme in the United Kingdom with the full proposals. This would be a much more economic way of doing things as far as we are concerned.

Lord Nathan

206. I think you have answered the question I was going to put to you. The point which I had in mind was the European Science Foundation's suggestion of pre-screening outline proposals as a solution to the problem of low success rates (1:6) for applications. I think it would be interesting to have your view on the extent to which SMEs would be prepared to go that far knowing that if they were successful they would have the horror of the further commitment and the reason for that is that they might feel that if they were successful they could not afford it any way. I was wondering how you felt about that.

(*Professor Brown*) It is very difficult. It might encourage a few more SMEs to become involved but I do not think it would solve entirely the problem of bringing more into the fold. It seems to me that the question, as it were, of transferring new technology into SMEs is perhaps as important as encouraging them to be involved in doing pre-competitive research. I think Mr Neale mentioned in earlier evidence that one of the problems we have in engineering is that we are simply not implementing enough of the things we know already and the transfer of technology into industry is not happening as widely as perhaps it should, and if something can be done within the European Commission's programme to facilitate this, perhaps using the analogy of our Teaching Company Scheme in the United Kingdom, that would be helpful particularly to SMEs.

(*Dr Parker*) I think one has to be a little bit careful with this global term SME. I think it depends very much upon the technical business of the company. If you take somebody like Oxford Instruments then as a world leader in a very small area they should be viewed, and view life, very differently from somebody in a much more mundane business. They are already quite close to the main science stream and no doubt much more capable of collaborating in Framework Programmes.

Baroness Platt of Writtle

207. You were saying that we are not good enough at putting the technology that we already know into action. Is not one of the best ways of doing that transferring the bright young researcher into the firm who might use him or her?

(*Professor Brown*) Indeed.

208. It is presumably part of the Training and Mobility of Researchers Programme of the European Union, but perhaps it is not happening enough.

(*Dr Parker*) I am not sure that you actually need a Framework Programme for it. I had a policy of recruiting the very best I could get, keeping them under the central research wing for a couple of years and then sending them out into the real world and into the companies where they performed in many instances quite magnificently.

209. That was the Cambridge Advanced Manufacturing Degree, was it?

(*Dr Parker*) I was their best customer for a number of years.

Lord Phillips of Ellesmere

210. I believe it to be true, and you and your colleagues can perhaps tell me if I am right, Professor Brown, that some years ago in the Federal Republic of Germany there was a scheme in which the government subsidised the employment of qualified engineers and scientists in small companies that did not otherwise employ them. This had a pronounced effect on the technological capabilities of those companies. Then I understand the European Commission stepped in and said that this was really against Community rules, but, nevertheless, the good had already been done in Germany.

(*Professor Brown*) It might be a better way of using these proposed tax credits.

211. It would also require, as I understand it, some change in the attitude in Brussels.

(*Professor Brown*) Yes.

Lord Lewis of Newnham

212. We have been touching on the problems over administration and in your submission you make a very clear statement about your views, which is that the procedures that have been introduced have made the administration for programmes easier for the European Commission but not necessarily for the participating partners. I wonder if you would like to amplify that and perhaps give us some examples.

(*Mr Neale*) I have personally tried applying for two or three of these programmes and the problem is that you do end up with a very substantial amount of paperwork to fill in and, also, the condition, quite rightly, that you should liaise with other companies and other universities in different parts of Europe does mean that the whole process is an extremely heavy one and very often the definition of exactly what subject area is being looked for is also a little bit loose and so when you put something together it is not necessarily focused straight down the line. The

Lord Lewis of Newnham *contd.*]

procedure is fairly complex and I think that some guidance as to what is likely to be successful, likely to be received favourably, is certainly required and I think some sort of filtering process is perhaps the starting point so that you can have a go, get it roughly assessed and if the answer is yes then you put in all the effort.

213. Who should be offering this advice? Do you think this should be advice offered by participating governments or should this be done by the Brussels people?

(*Mr Neale*) I think it should be up to the Brussels people to give you an initial assessment as to whether they are likely to be funding you or not.

(*Professor Brown*) Could I offer one or two examples which were part of the backdrop to the piece of evidence that Lord Lewis has identified and questioned me about. These are really principally from the perspective of universities being involved in these programmes. One of these is the very short notice that often arises in terms of the start dates for projects. The rule of the game is that the contract will start on the first day of the month after signing the contract. Contracts are only signed by very senior people in Brussels and if they happen to be out of the country and turn up on the 30th of the month they sign it then and you are expected to start a day after or two days after. For industry this may not be such a problem because they already have staff on board whom they are proposing to use for this project, but it is still a bit of a shock to the system if you get two days' notice to begin a major programme of research. For universities the problem is made more complicated by the fact that we generally have to recruit research assistants to work on these projects and you cannot do that at a moment's notice. That is an example of rules of the game that suit the bureaucrats in Brussels rather than the people who are actually doing research. I should add that it is extremely difficult to get an extension to a contract to compensate maybe for a late start consequent upon you wishing to recruit staff. We think that in the initial paperwork there is too much emphasis given to setting out in some detail your exploitation plans, particularly for research that may be very pre-competitive when you cannot be sure about what will come out of the research and therefore cannot write a realistic exploitation plan in any sort of detail, but because it happens to be on the check-list in Brussels it is something you have to do. There are other matters like environmental impact that have to be assessed and you are required to do this even on a project where there may well be no environmental impact. Again this suits the check-list in Brussels but does not suit us. There are financial problems over exchange rate loss depending on the day of the week when the payments are made—often late—to the universities and to the companies which we cannot get any recompense for. The other problem that sometimes arises, which again is imposed by the way in which the committees operate, is when the review committee puts together two projects. You may have a team of six people there and a team of six people here and they will say that as these two projects look similar they will get them to work together, which is more or less imposed on one. This is a most unsatisfactory way of beginning on a research programme where the chemistry between the individuals concerned on the team has to be right otherwise it is not going to work. I have seen examples of difficulty in this respect in the team you have built up; it may be with a group who you have only recently met and had one or two meetings with. Having another group imposed on you seems to us to be unacceptable.

Lord Porter of Luddenham

214. I wonder whether Professor Brown could take this a little further. Suppose you were writing to advise the European Commission on the question of how much notice one wants before you start. You were talking about a few days. In my experience it is almost a few years, certainly a few months because until you know that you have got the money you cannot order the equipment, you cannot appoint the people that are going to do it and so it is really quite a long lead-up time to it. As I think we all know, in a sense you almost have to have done the work before you start. There is a well-known technique of being one Framework out of step. Suppose we could give the Commission a definite time. How much notice do you think definite approval of the programme and the starting of that programme should be?

(*Professor Brown*) I would say three months is reasonable, but I would prefer to see some degree of flexibility such as we have with the Research Councils in this country where you are given an award, you have a nominal start date and if you are having difficulties in getting tooled up with people or equipment then you can delay that start date by up to six months. This is a better situation and you get better work done as a result of it. The timescale works the other way because when I have to advise colleagues around the university about prospects for European support for their research the first thing I say to them is that they must think very long term because the gestation period which I think you were alluding to between starting to put a team together, going through the paperwork and getting a decision out of Brussels is anything from nine to 12 months or even longer. So in that sense there is a period when you are thinking about it, but the finances within universities do not allow you to start spending money on a particular project which is going to be funded from outside until such time as the contract is signed, at least not in a serious way.

Baroness Platt of Writtle

215. Would you like to comment further on the costs and delays that result from Europe?

(*Professor Brown*) No. My colleagues might want to give the industrial perspective.

(*Dr Parker*) There is obviously a great deal of travelling that is involved. One does not grumble about that. I personally would grumble about the lack of urgency in paying the bills. I have sought to square my books at the end of the year and found the various Commissioners had gone to play golf or whatever they do from mid-December onwards. Also, I think the very way in which the applications

Baroness Platt of Writtle *contd.*]

are invited is extremely wasteful. 20,000 of the applications for Framework IV were rejected. You can work out at least as well as I can what that might have cost.

216. Having said that, I suppose there are two follow-up questions. Firstly, how could that be improved? Obviously the bureaucracy is not very helpful in Brussels. Secondly, you say in your memorandum that the main criterion for using European research is greater cost effectiveness than on a national scale. I wonder whether greater cost effectiveness is possible after all you have said.

(*Dr Parker*) I think what we are saying is that there is a considerable advantage albeit discounted somewhat because of the additional bureaucracy. We are not saying that the advantage is wiped out, but it is partly negated, there is no doubt.

Lord Phillips of Ellesmere

217. I wonder if we could go on from this discussion of costs in industry to think about the costs to a university of taking part in a European programme. There are complicated rules about what one can ask for and under what sort of headings, and I wonder if you could say something about that. To what extent does it cost you money from your university funds actually to accept a grant from the European Union?

(*Professor Brown*) I am pleased to have the opportunity to respond to this from the university's perspective. If I am advising colleagues in the university sector about various funding opportunities for research purely on the basis of the income to the university then the European Commission is very low down the list. I suppose charities are even lower because we get no overhead whatsoever from charities. The fact of the matter is—

218. Could I interrupt and say that I would rather talk about full costs than overheads.

(*Professor Brown*) We wish to recover the full costs of our research at universities and government increasingly is requiring us to do this, although not every government department follows that line. Universities receive full marginal costs for the work that they do on a European Commission project, but they are only allowed to claim a 20 per cent overhead. That corresponds approximately to 37 per cent of overheads on our salaries, which is normally the way in which we express them when we are dealing with research contracts with industry or grants from Research Councils. Given that the independently assessed overhead rates for universities vary from between 80 to 120 per cent, depending on which institution you are talking about, you can see that we are subsidising each European Commission contract to a substantial extent. From a quick calculation on the situation in my university where about 20 per cent of our £42 million of awards last year came from Europe, I estimate that we are subsidising through other funding streams our European Commission work to the tune of about £400,000 a year. That has to come from our higher education funding grant which does not compensate us to this extent or anywhere near it.

Lord Lewis of Newnham

219. That is £400,000 on what magnitude of grants?

(*Professor Brown*) On about £7 million-worth of grants.

Lord Phillips of Ellesmere

220. You will understand why I do not like the word "overhead". With all respect, your reply included, to my mind, some rather strange expressions, "full marginal costs" followed by "overheads on our salaries" provided. This is a rather complicated way of thinking about how you achieve full cost funding of the work you are trying to do. I am relieved to hear that you do take the trouble at the end of the day to work out how much money you had to put in in addition to what was being provided by the European Union. But might it not be better if the European Union actually was asked for the full costs to begin with and the full costs might even include things like amortising of equipment and so on which is an important issue?

(*Professor Brown*) One is allowed to include that and we do.

221. But full costs is not a concept that the Commission understands.

(*Professor Brown*) Quite. When I said full marginal costs I meant marginal costs. I meant that we are allowed to charge for staff who have to do the work. We are allowed to charge for capital equipment against appropriate depreciation in percentage use. We are allowed to charge for travel and subsistence and consumables, but we are not allowed to charge more than 20 per cent on the total account towards the overhead costs of the universities.

222. But you would not need to charge anything as a percentage of income if you actually were allowed to itemise all the full costs.

(*Professor Brown*) I see what you mean, yes, that is right.

Lord Lewis of Newnham

223. Do you actually dissuade any of your people from actually applying on the grounds that you cannot afford it as a result of this?

(*Professor Brown*) No, never. University staff are individuals and our view at the centre is that the real research talents of the university are not in the centre, they are in the individual academic departments and they pursue their research agendas. We provide what support is necessary in the centre. They get a lot out of working with colleagues around Europe for the reasons I outlined in my evidence earlier. I think that those who decide not to pursue research opportunities in Europe do it for their own reasons and many of those are concerned with the large amount of administrative bureaucracy. We only go so far as recommending to our colleagues that they should not take the lead in a European Commission project. They should perhaps join as partners with some other organisation, preferably with an industrial organisation taking the lead because there

Lord Lewis of Newnham *contd.*]

is an awful lot of administrative work for which you do not get properly recompensed.

Lord Phillips of Ellesmere

224. What are the chances that in some fine year your colleagues will ask for so many European grants that you will go bankrupt?

(*Professor Brown*) I do not think that is likely. We have a balanced portfolio and as a university I think most departments like to have a balanced portfolio of research income as well.

(*Dr Parker*) Since I have a toe in the University of Bath (no pun intended!) I would just say that European grants are regarded as desirable and prestigious amongst my academic colleagues. In some universities they are regarded as of a premium nature and used as a means of highlighting people who are capable of not only doing good work but taking initiatives.

Lord Lewis of Newnham

225. May I just touch on one point which has not been covered and I am not sure of my facts on this, but the Mobility Programme which is in part associated with this certainly in the initial stages led to rather peculiar salary structures for the participating Fellows in this scheme and I am not clear whether this position has been cleared up now from the point of view of overheads or participation or contribution towards departmental costs.

(*Professor Brown*) I am not sure I can answer that in detail. We broadly like the Mobility Programme. A number of people in universities take advantage of this. It is certainly very helpful for the individuals concerned. I am afraid I cannot answer in detail on the cost implications.

Lord Soulsby of Swaffham Prior

226. There was something I wanted to come back to and that is the question of recruiting once you get to know that you have been funded. One way of getting over this is to almost pre-recruit either by indirect correspondence or even by advertising to assess the interest of people in a programme if it were to be funded. That can shorten the time considerably. I suppose you do that in your university too.

(*Professor Brown*) There are difficulties in that, as I said in my answer to Lord Porter earlier, we do not have staff sitting around waiting for research contracts to appear. We tend to recruit people on short-term contracts of employment, typically three years, often linked to the study of a PhD degree because that way you can recruit high quality people at a relatively low salary because there is a carrot at the end of the stick, as it were, and so in general we do not pre-recruit and hence the problem I identified earlier about short timescales for starting projects up.

227. I realised the latter part of it, yes. We found this quite useful in Cambridge. Could I just take up your comments in your memorandum where you support the idea of Task Forces being able to commission and direct work, but then you say you would not wish them to have any budgetary control. I would just like to explore how you see this working. Being able to commission, yes, but it seems to me that if you are going to direct the research there has got to be some financial mobility in that. Why do you say that they should not have any financial mobility?

(*Professor Brown*) I think this came through in evidence from my colleagues in another university. The concept of Task Forces which can cut across the interests of various directorates' multi-disciplinary work seems to us to be good. Our concern is that they do not have a well-defined structure and a well-defined reporting mechanism at the moment, so if they were to be given budgets we are not quite sure where that would come from and to whom they would be accountable. That is why I think we suggested Task Forces to identify areas of work, but when it comes down to letting contracts then these should come under one of the directorates or perhaps a combination of them where the financial control and reporting mechanisms exist.

228. By direct you mean indicate to the overall body the area rather than take a note of what is going on in their research and modify it accordingly?

(*Professor Brown*) No, I think they have a role perhaps in overseeing research, but my understanding of Task Forces—and I do not pretend to be an expert on them—is that they have operated a little bit like Technology Foresight groups have in the United Kingdom, of thinking ahead, identifying areas of research, particularly multi-disciplinary areas to cut across the interests of a number of directorates and that seems to us wholly laudable. It seems the structure at the moment is not well defined and the financial control would not be in place if they were given a sum of money to actually control the contracts. This should be done through the directorates where they have the mechanisms in place, albeit somewhat bureaucratically, as you can see.

229. I am fearful that this would just increase the bureaucracy. If a new direction was perceived in the research then you would have to go through an enormous lot of bureaucracy in order to achieve that.

(*Professor Brown*) I think we would be quite happy for them to have the money to drive what you might call directed programmes in the context of the way in which we operate through some of our Research Councils in this country provided there was proper accountability.

(*Dr Parker*) It is a personal opinion, my Lord Chairman, but I rather see Task Forces as a means of getting things done quickly and efficiently. They are very good at that. That is not to say, however, that they are the masterminds behind the programmes. I would prefer that to remain with the people who are currently determining the funding as at present. I think otherwise you are going to have a difficult dichotomy.

(*Mr Neale*) I would suggest a useful model for the position of the Task Forces would be to have them standing slightly to one side of the cash stream and looking over it and helping to focus it, but it would still be connected to the main body, with all their review and control processes. The Task Force would help to keep it on track as to what is required.

Lord Porter of Luddenham

230. Your sister, the Royal Society, has said very firmly something which I think most of us would agree with, i.e. that the Framework Programme and indeed most other funding programmes should fund only the best science. However, that does seem at first sight to conflict slightly with their laudable objective of looking after the less advanced countries with regard to improving their scientific ability. The Royal Society made the suggestion that these two should be kept quite separate, that funding should be on scientific excellence only but that the other side of the less advanced scientific nations should be coped with by a framework training function, still under the framework but they would be judged on quite different criteria. What is your opinion of this? Is this a good idea?

(*Professor Brown*) I think we would very much agree with the Royal Society's view on this that was expressed under "cohesion" on page 55 of the Parliamentary Office of Science and Technology's recent report.

231. So you have nothing to add to it, that would be the way to do it?

(*Professor Brown*) I think we strongly believe that you should not compromise the excellence of the science or engineering programme merely to include people from southern Europe.

232. So the applications themselves for research support would take no heed at all of where the application came from or the under-development of the nation?

(*Dr Parker*) Except to the extent that you will still need to have at least two co-operating members.

Lord Lewis of Newnham

233. Have you any examples of occasions where you believe that this present arrangement (which I happen to not like very much, I agree very much with Lord Porter) has been able to influence or affect how programmes actually operate?

(*Dr Parker*) I think there are a number of programmes in which you have two or three partners who are very much on a parity and you can probably have a disparate one. I think we have all experienced this. Whilst they probably have some particular expertise, one sees the thing as a cause of difficulty and in many instances an impediment to progress throughout the contract. So having experienced that I am only too pleased to agree with the Royal Society's view. There obviously needs to be something done for the less able, but I can only agree this is not the programme.

(*Professor Brown*) I cannot think of a particular example, my Lord Chairman, but there certainly is an attitude at large, perhaps less now than there was in the previous framework, that in order to be successful in bidding for European Commission funds you need to have three or four good organisations that would do the work, a southern European contributor to satisfy the social dimension, the French because they were rather good at getting the money, but this is gossip and I am sure you would wish to discount that view.

Baroness Platt of Writtle

234. I was rather interested because the Royal Society do put forward a solution to this problem as being to give Fellowships to the less able countries and they spend time with a project and then go back to their own country. Then they go on to say under "Training and Mobility" that the current programme is unsatisfactory because the balance between the level of stipend versus the level of research support is wrong, and "At present we believe the former is too high and the latter too low." I wonder whether you feel the same.

(*Professor Brown*) Can I just be clear about that, the stipend is too low—

Baroness Platt of Writtle] No, the stipend is too high and the level of research is too low.

Chairman

235. Perhaps you would like to comment in writing on that.

(*Professor Brown*) I think we would broadly agree with this concept of dealing with raising the level of technology in the less developed countries through some other mechanism. The Mobility Programme might be a way of dealing with this. You must not dilute the research which is being conducted in your main programme.

Lord Lewis of Newnham

236. My Lord Chairman, I am just slightly concerned about this. It does seem to me that it is conceivable that a firm from a less able country may learn a tremendous amount about being in co-operation with you and benefit on going back to base. Although teaching of this sort may be very painful, it may nevertheless be a very effective way of dealing with it. In the Mobility Programme you are normally taking an individual who then goes back, but you can actually be dealing with the firm. It seems to me that that is not quite as black and white as it would appear at first, Professor Brown.

(*Professor Brown*) It would require a change to the rules to allow, as it were, people or organisations from those countries to come and sit at the feet of the rest of us, if I can use that analogy, and there should be a financial framework within which that would happen. It is a technology transfer issue.

(*Dr Parker*) I am sure Lord Lewis is quite right, there are many grey cases. Firms might willingly collaborate with a slightly lame southern European partner if that part of southern Europe can offer a good market for the product if the research were successful.

Chairman

237. I wonder if I could take you back to your written evidence where you refer specifically to the Joint Research Centre and you take the view that, while it is no doubt healthy for the Joint Research Centre to raise some monies through contracts, you are not keen for this to be taken too far. We have received evidence from the Office of Science and Technology who would like to see 80 per cent of funds coming through competition and indeed, other

Chairman *contd.*]

written evidence that suggested 100 per cent on the basis that the Joint Research Centre is top-slicing funds and that an element of competition might be desirable. Would you like to comment on why you were cautious about this concept?

(*Professor Brown*) I do not personally have any further background that I can bring to bear on this, but we would be happy to augment this in writing for you.

238. Perhaps that might be helpful to us.

(*Dr Parker*) I think we did really want the Joint Research Centre to be funded from policy funds because that was what it was there for. I think a useful view is that it enables, as it were, big science such as we authorise to be done cost effectively.

239. I think there may be a misconception if you think it is being funded from non-scientific sources, but I think this is something where perhaps it would be worth sending some written evidence in, if you would like to.

(*Professor Brown*) I think we would be concerned about the top-slicing element if it was not cost effective in terms of mobilising major facilities.

Chairman] I understand that the Joint Research Centre is effectively top-slicing the science funding which would otherwise go to the Framework Programme. Could I ask my colleagues whether there are further questions anyone wishes to put?

Lord Phillips of Ellesmere] Could I ask you, as representatives of The Royal Academy of Engineering, which I believe to be a member of the European Science Foundation and which I expect has nominated members for the European Science and Technology Assembly, whether you are happy with the bodies that have been set up to advise the European Commission on the nature of its scientific and industrial programmes and whether you think they are effective?

Chairman

240. I think that is another one which a response in writing might be helpful.

(*Professor Brown*) I think this is one we might want to consult on, if you do not mind.

Chairman] Could I say also you have given us some very helpful, quite specific information about the management of Framework Programmes and, in particular, Professor Brown, you referred to some very specific examples in your own experience. Again if you are to be writing to us, as I suspect will be the case, with some follow-up, it would be very interesting to have some very specific examples because we will have the opportunity to talk to the Commission later. We are most grateful for the very specific information you have given us.

Lord Porter of Luddenham

241. I would like to ask the distinguished engineers how they feel about the seven JRC institutes. Four of those are at least partly in the nuclear business.

(*Dr Parker*) Yes.

242. Four out of seven are. ICIS is nuclear reactors, I2 is the nuclear fuel side of it, IRNM is the nuclear safeguards and IRN is nuclear pollution. Do you feel that in the context of Europe or Britain or anything else that the four out of seven research centres should be devoted to this one subject?

(*Dr Parker*) It does seem disproportionately high. On the other hand, a lot of the nuclear work has been concerned with nuclear safety which blossomed after Three Mile Island.

243. That was one of the four?

(*Dr Parker*) Yes, that is right. I think it is partly historical and yes, I would like to see a dilution of that without taking away their main role. In fact I was one of the people who said that in order to keep them honest and sharp, they should in fact compete for some of the funding for the other projects in order to demonstrate, indeed to become and then to demonstrate that they were cost-effective.

Lord Porter of Luddenham] My Lord Chairman, as Dr Parker says, it is doubtless historical because it was all set up with nuclear and coal in mind.

Chairman] I think that brings us to the conclusion of this session. We have kept you for some time, Professor Brown, Dr Parker and Mr Neale, and we are most grateful to you for the help you have given us today. Thank you very much.

TUESDAY 26 NOVEMBER 1996

Present:

Butterworth, L.	Phillips of Ellesmere, L.
Craig of Radley, L.	Platt of Writtle, B.
Gregson, L.	Porter of Luddenham, L.
Haskel, L.	Selborne, E. (Chairman)
Nathan, L.	Soulsby of Swaffham Prior, L.

Memorandum by the Economic and Social Research Council

INTRODUCTION

1. The Economic and Social Research Council (ESRC) welcomes the opportunity to contribute to the enquiry into *The Framework Programme and European Research*, and in particular to comment on the part played by the social sciences in the Fourth Framework Programme (FP4) and their prospective contribution to the Fifth (FP5). The Council believes the decisions taken about the place of social science in FP5 will be important both for UK research and for the success and impact of the Programme.

2. Much of British social science will benefit from the challenge of contributing to strategic transnational issues, and from the opportunity to undertake comparative European work. The funding of comparative and co-operative social science research within FP4 has been a genuine and unique incentive for work at the European level, which should be continued within FP5.

3. This is not however only a question of benefit to UK social science. There is a growing belief that the aim of making Europe more competitive at the international level (Article 130f of the Maastricht Treaty) can best be achieved by a broad scientific programme which includes the study of the economic and social drivers of (and barriers to) innovation, effective production processes, environmental improvement and sustainable growth. This view has recently been argued strongly in the advice given to the Commission by its own European Science and Technology Assembly (ESTA). Extracts from the official ESTA position are attached to our submission (Annex 1).

4. We would wish therefore to argue that there should be a positive interactive relationship between UK social science and the strategic needs of the European Union. This could and should be reflected in FP5.

5. The detail of our submission to the Select Committee is organised according to the specific questions which the Sub-Committee has posed. It is also framed within the policies of Office of Science and Technology (OST), and the OST's own submission, to which we have had the benefit of contributing.

DIRECTION

1. *What lessons should be derived from the Fourth Framework Programme?*

1.1 Within FP4, there have been three approaches to the funding of what the Commission tends to refer to as "socio-economic research". Firstly it has been the central focus of the Targeted Socio-Economic Programme (TSER). There are also Programmes where the social sciences are included as a real component of a multidisciplinary Programme as in the Human Dimensions area of the Environment and Climate Programme (COPEC), and in the Transport Programme. Here serious scientific results can and will be delivered. The third approach has been to add on a small amount of social science work to Programmes where no attempt is made to develop a genuine multidisciplinary perspective. The most notable examples of this can be found in the implementation of the so-called 5 per cent Rule, agreed in the co-decision on FP4 between Parliament and the Council. The expectation is that 5 per cent of each physical science Programme will be allocated to social and ethical aspects of the Programme topic. This has not been successful, as there has been no mechanism for defining genuine research topics which can really add value. As with any other field, research priorities cannot usefully be set by bolting on additional work in this last minute way. This has important implications for the setting of priorities within FP5.

1.2 The socio-economic contribution on FP4 has been further weakened by the lack of co-ordination within the Commission, which has led to weak links between the sections of DGXII dealing with research on economic and social issues, and both other parts of DGXII and with the policy DGs. We believe there would be value in an external study of the communication and co-operation between DGs and the scope for more effective transfer of knowledge within the Commission generally.

1.3 Within FP4, the TSER Programme has suffered from two problems which may be specific to it. Firstly, the early phases of this Programme revealed that DGXII was unable to support it with sufficient staff who had the necessary professional knowledge of the subject matter, nor to provide the necessary administrative structure for the Programme. This matter became sufficiently serious for the Government's Chief Scientific Adviser to express the UK's concern formally to the Director General of DGXII, and other countries are also believed to have made similar representations. The initial commissioning and management of TSER have been seriously affected by this lack of support. The lesson is that the Commission must develop the capacity and flexibility to take on new work. We return to this in our submission on Framework Programme administration. (Q8).

1.4 The second problem was that the content of TSER was shaped by a series of quasi-political negotiations, which led to there being three intellectually separate sub-topics within it—i.e. S&T Policy, Education and Training, Social Integration and Exclusion. More attention needs to be given in FP5 to a programme of work which is both policy relevant and organised on a proper scientific basis.

2. *Should there be a Fifth Framework Programme? If so, what should be the main objectives or focus and how should the priorities be set?*

2.1 We note and concur with the general support for a further, fifth, Framework Programme. We also support the arguments for it being more focused and better integrated, as for example proposed by OST.

2.2 Setting priorities for FP5 is however a complex and difficult task. Formally the writing of the draft Programme lies with the Commission, and the final decision with the EU science Ministers and the European Parliament, but in practice the process involves a wide range of organisations, interest groups and individuals, including industry, and academic scientists. The OST has suggested a much greater role for "users", which is consistent both with the 1993 White Paper and with the UK Technology Foresight exercise. Early Commission papers seem for their part to be emphasising the need to strengthen the partnership between scientists, industry, universities and consumers, and to focus on the social and economic needs of Europe's citizens. We welcome these new emphases, but would want to draw attention to the difficulty of identifying the real range of "users" and of incorporating citizens' needs within the priority-setting process. If FP5 is to provide valuable new science-based knowledge to meet strategic needs, then the challenge is to incorporate social needs, public policy requirements and industrial interests without allowing the "capture" of the Programme by any one set of interests, or the dilution of the scientific value of the work to be done. It will also be important to allow the best European scientists to have a share in the shaping of the research. We suggest this can best be achieved by defining FP Calls for Proposals in such terms as will explicitly leave space for the creative contributions of the scientists themselves. This can be achieved within a Programme which is itself properly focused.

2.3 Though focusing on the UK, the 1995 OST Foresight reports may nevertheless provide valuable inputs to FP5, and this is recognised in the ESTA report referred to earlier in this note. Many of the Foresight priorities seem to coincide with similar analyses in other countries. There seems for example to be a great deal of agreement about the importance of:

- information and communication technologies, and the "information society";
- biotechnology;
- innovation, entrepreneurship, and improved business organisation and processes;
- the diffusion of technologies, and of new knowledge;
- environmentally friendly technology; and
- policies for sustainable economic growth.

2.4 From the perspective of the social sciences, ESRC welcomes the challenge of multidisciplinary themes of this kind, believing that economic and social research has much to contribute, alongside more technologically oriented research. Here we would also want to restate our belief that the development of a more competitive and effective Europe also requires attention to be given to the broader social and economic context in which scientific progress and industrial growth can be achieved.

Here we would want to cite the Conclusions of the ESTA report, drawn up by a high level group of European scientists and industrialists:

> *"Science or technology driven policies may have the inherent danger of not addressing the main challenges that are at stake for Europe. The role of social sciences in industrial competitiveness and its societal contexts should be considered carefully. The social sciences may help (by) informing political and strategic decision making processes and may also help a society to reflect on its own capabilities and weaknesses. Furthermore appropriate use of social sciences will strengthen its ability to project these capabilities into the future and thus build a societal framework for a competitive economy.*
>
> *(We recommend that) the various levels of social and economic research should be carefully addressed so as to strengthen the quality of the knowledge base of European society and economy. Transdisciplinary research should be encouraged in all sectors, but also specific programmes important to Europe's competitive and balanced development should be specifically included.* ***In particular, studies of social and cultural conditions and implications for Europe, and increasing the understanding of social and cultural integration and disintegration in time of major technological changes should be considered.****"* (pp 54-55) (Our emphasis).

2.5 The ESRC has argued elsewhere that the Framework Programme should include specific programmes which help to improve policy makers' understanding of the economic, social and indeed political development of Europe. It supports the proposal from the European Science Foundation to include "European Institution Building and Citizenship" in the FP5 to explore the processes of inclusion and exclusion in European integration, social cohesion and social citizenship and illegal markets and social order. A programme of this nature would fulfil the requirement of contributing to European policy and also add value to the research which is being carried out at national level in a number of countries.

2.6 A second generic social science contribution would be a programme focusing on the "Economic and Institutional Consequences of the further Expansion of the European Union" which would examine the changing roles of national and supra national regulatory frameworks and their impacts at the institutional level.

2.7 Programmes focusing on these two vital issues will not be expensive and we believe that they could be funded within a funding envelope similar in size to that of FP4. They would provide a sound basis for development of the current TSER Programme, along with the socio-economic contributions to themes of the kind described in paragraph 2.3 of this note. Taken together, this would be an appropriately focused and balanced contribution from social science to a prioritised FP5.

3. *What should be the balance between basic and applied, pre-competitive, and near-market research funded through a Fifth Framework Programme?*

3.1. ESRC supports the OST view that FP5 should not be concerned with basic research. The tasks we have suggested for the social sciences are properly described as strategic research, policy relevant and on subjects on which contributions to policy have already been made.

4. *What should be the role of Task Forces in a Fifth Framework Programme?*

4.1. We fully endorse the OST's view that the Task Force approach could have a valuable multidisciplinary, multi-interest role in FP5, but that it needs to be adapted within a reformed management structure. We have already argued that consideration needs to be given to the representation of a wider range of interests within such a system.

5. *Can it be demonstrated that the UK gets clear value for money from participation in the Framework Programme and, in particular, what has been the impact on industrial competitiveness, social and economic sectors?*

5.1. As stated in the Science Policy Support Group (SPSG) submission to this enquiry, this is a difficult issue on which there is as yet only a small amount of research-based evidence. ESRC is funding a programme of work on European science policy which should help to fill this gap, as should work funded under the TSER S&T Policy area. It is too early as yet to comment on the output from the socio-economic work within FP4, and there was very little funded in FP3. However, from the evidence we have seen the UK has secured the largest single share of funding within the first Call for TSER and also in the Human Dimensions area in COPEC. UK social science is generally acknowledged to be amongst the strongest in Europe, and can be expected to compete successfully in any open calls within FP5.

PRIORITIES

6. *What should be the role and priorities of the Joint Research Centre, and how should its activities be funded?*

6.1. Nothing in our experience of the first two years of the JRC Institute of Prospective Technological Studies in Seville goes counter to the OST recommendation that the JRC and its satellite Institutes should be expected to compete for 80 per cent of their income. The Seville Institute has appropriated 33 Mecu of the modest TSER budget of 147 Mecu. It has however only very limited accountability to the TSER Management Committee for this budget. The obvious benefits of competition for funds need to be brought to bear here.

7. *How should the EU meet its "cohesion objective" of enabling SMEs and Member States with less scientific expertise to benefit from the Framework Programme, while ensuring that the highest scientific standards for EU research are met?*

7.1. ESRC has little to add to the OST view on this, except to reinforce the importance of maintaining scientific quality, and to suggest that there may be more effective ways of strengthening the scientific capacity of less favoured regions than assisting their participation in EU research programmes.

FUNDING AND ADMINISTRATION

8. *Does the European Commission have the adequate expertise and the mechanisms to support the Framework Programme?*

8.1. There is a great deal the UK could and should do to press for improved competence and different procedures within the Commission, and within DGXII. ESRC strongly endorses the proposals made by OST for increased transparency, improved ex-ante and ex-post evaluation, and improvements at the contract negotiation stage. From our experience with TSER, the UK (led by OST) has very commendably taken a visible lead on this issue which has not always been popular with the Commission, but is very much needed. If the Framework Programme is to deliver high quality new knowledge to policy makers, it will have to retain the confidence of European scientists—and in some cases to regain it. Stronger pressure of the UK position on this can only be beneficial.

8.2. As we have said earlier in this note, we also wish to stress the need for the Commission to have, and deploy, expertise in all the areas of the Framework Programme. To date, shortcomings in the support of TSER have seriously undermined the capacity of this Programme to meet its objectives. There are signs that these shortcomings are beginning to be addressed, but this is not yet fully demonstrated. In any event these shortcomings must not be allowed to continue into FP5.

9. *Is the current length of Framework Programmes too long and would they benefit from shorter time frames with more flexible funding? Alternatively, should the Programmes be longer?*

9.1. We support the OST view that the Framework Programme should last for a longer period, with improved mechanisms for adjustment and adaptation during the period. It is frankly absurd to be beginning to plan the next Programme before the science has got underway in the present one. Our recommendation would be for a six year Programme period.

10. *Should Task Forces have ear-marked funds to support their own research programmes?*

10.1 Much will depend on how Task Forces develop. We have nothing to add here to the OST view.

11. *How should the UK allocate funding for the Framework Programme and other EU research initiatives to ensure that UK researchers are not disadvantaged?*

11.1 The attribution policy is a matter for Her Majesty's Government. The OST submission spells out the benefits in terms of concentration on priorities. We would only observe that attribution may have the unintended consequence of reducing the quantity and quality of UK inputs to debates on the Framework Programme, particularly in the early stages when new, creative thinking may be particularly needed. This is because many will be reluctant to put forward suggestions for anything other than continuation or reduction. New thinking can be seen as too risky.

CONCLUSION

We hope these views will be helpful to the Sub Committee. The subject of the enquiry is important to the ESRC and, we believe, for UK science policy. We would be happy to give oral evidence to the Sub Committee if that is judged helpful.

Annex 1

Extracts from the Official ESTA Position in Relation to the 5th Framework Programme

"Any increase in innovation and competitive advantage is the product of complex processes involving knowledge and consideration of several aspects having to do with the overall amelioration of the social conditions of production . . . this means inevitably a greater involvement of expertise from the social sciences. To limit the contribution of the social sciences to remedial actions would definitely be too little—and too late"

"Asystematic ex cathedra reflection on the major social concerns in Europe at the present time is absent in the main European Union research programmes, despite the fact that repeated explicit requests for the inclusion of such a programme are included in most preparatory documents . . . it would be difficult to deny that this is an urgent and widespread concern."

"If we want to understand which are the conditions for the transformation of the results of technological research and skills into innovation and competitive advantage we must invest in research on the social aspects of productive organisations and their environment. Particularly because of the weakness denounced by the (EC's) Green Paper on Innovation (p. 5)"

"Science or technology driven research policies may have the inherent danger of not addressing the main challenges that are at stake for Europe. The role of the Social Sciences in industrial competitiveness and its societal contexts should be considered carefully. The social sciences may help in forming political and strategic decision making processes, and also help a society to reflect on its own capabilities and weaknesses. Furthermore, appropriate use of social sciences will strengthen its ability to project these capabilities into the future and thus build a societal framework for a competitive economy"

The various levels of social and economic research should be carefully addressed so as to strengthen the quality of the knowledge base of European society and economy . . . In particular, studies of social and cultural conditions and implications for Europe, and increasing the understanding of social and cultural integration and disintegration in times of major technological and economic changes should be considered."

Supplementary letter by the Economic and Social Research Council

I write to you with respect to the evidence our Chief Executive, Professor Amann, submitted to the House of Lords Select Committee on 14 October. In advance of the oral evidence ESRC is due to give on Tuesday 26 of this month, we need to clarify and amend the reference we made in paragraph 1.1 of our written evidence.

In that paragraph we commented on the additional work on socio-economic impact which is expected to be carried out within Fourth Framework Programme first activity research programmes. Over time we had heard this referred to as the "5 per cent" rule but on examining the original Decision of the European Parliament and the Council (1110/94/EC, 26 April 1994), we find that no specific percentage was agreed. We can only assume that 5 per cent has been adopted at least within some parts of the European Commission as an informal maximum.

The text of the relevant section of the decision is as follows:

> "In addition to TSER under the first activity, research in the social sciences under every theme in the first activity, and also under the second, third and fourth activities, will be coordinated with research in the exact sciences, natural sciences and engineering with a view, in particular, to exploring the socio-economic context of the activities planned and the possible consequences thereof."

As we understand it, this form of words was intended to ensure that work on socio-economic impact was included within each specific programme beyond TSER, and that these activities should be coordinated by the Commission.

Our view still remains that the execution of this agreement seems to have varied considerably from programme to programme, that there seems to be no coordinated analysis of the outcomes, and that this is in any case not an appropriate or effective way for socio-economic analysis to be included in the Framework Programme. We apologise, however, if we have set in train consideration of the 5 per cent maximum as we can as yet find no evidence that such a figure was formally agreed.

I hope this may help to address this issue in advance of our appearance before the Select Committee.

C. Caswill
Director of Research

22 November 1996

Examination of witnesses

PROFESSOR RONALD AMANN, Chief Executive, and MR CHRIS CASWILL, Director of Research, Economic and Social Research Council, called in and examined.

Chairman

244. Welcome, Professor Amann and Mr Caswill. As you know, we are conducting an enquiry into the Framework Programmes, particularly the progress on the Fourth and the forthcoming Fifth Framework Programme. We are most grateful to the ESRC for the written evidence you have submitted. Is there anything before we ask our questions that you would like to say by way of introduction, indeed would you like to introduce yourself and your colleague, Professor Amann?

(*Professor Amann*) Thank you, my Lord Chairman. I am the Chief Executive of the ESRC. My colleague, Mr Caswill, is the Director of Research and he also takes the lead for the Council in our relations with the European Commission and heads up the international office. Could I say just a few words of context to add to our written response. We very much welcome the opportunity to make some observations about the Fourth Framework Programme and also about the forthcoming Fifth Framework Programme. We think that European funding in general is a very important supplement to the large and vigorous national programme of research which we have and adds an important comparative dimension to it. We, generally speaking, believe that the Fourth Framework Programme and the Targeted Socio-Economic Research component within it has been a success. The United Kingdom Economic and Social Research Council has we believe played a very important role in shaping the

Chairman *contd.*]

content of the social science part of the Fourth Framework Programme and my predecessor, Professor Newby, in particular played an important personal role. If we look at the outcome—and of course we can only evaluate the outcome at this point in terms of the allocation of projects, we are not yet in a position to make an estimate of the scientific quality of the research that is being produced—but if we look at the pattern of allocation then clearly research teams of individuals in Britain have done very well in the first call for Targeted Socio-Economic Research. In that first call 52 research teams in the United Kingdom have been funded. That is a substantially larger number than any other country in the Community. Next down in the league table, if I may refer to it in those terms, comes France with 34 teams funded, then Italy and Holland with 33 and then Germany with 27. There is some clear water, so to speak, between the United Kingdom and other European countries. If you move simply from receipt of funds to intellectual leadership and look at all those research teams in terms of the total number of projects then in 13 out of the 38 major projects that have been funded there is a principal investigator from the United Kingdom. We are pleased with the opportunity to apply for that funding. We are pleased with the outcome. We think that it reflects on the high quality of social science research in Britain and also, I think I would like to add, it reflects to a degree on the dynamism of our research community for whom we have prepared training packs and organised regional meetings so that they can develop professional applications and maximise their chances of receiving funding. If we look to the Fifth Framework Programme, again the ESRC has been involved in shaping the advice to the Commission from the European Science Foundation. I myself was a member of the task force that helped to write that advice. To date we are very content with the position which has been given to the social sciences, both by the European Science Foundation but also by the European Science and Technology Assembly—ESTA. We were especially struck by the centrality of the social sciences in ESTA's thinking and in particular the interface between economic development and social development which of course is consistent with some of the findings of our own Technology Foresight in Britain. We note the consensus which can be detected in all of these documents about the importance of the user dimension and we are happy with that, it is consistent with the ESRC's own thinking in constructing our own thematic priorities. In short, we are satisfied with the principles of this funding. We are content that United Kingdom researchers have benefitted from it materially. We have some reservations about both process and cost which we have expressed to you in our written submission and I would anticipate that perhaps we may receive some difficult questions which cover that ground.

245. Well, Professor Amann, I do not want to disappoint you on that. Let us just explore the 52 teams which you say have been successfully funded and that is clearly better than the other countries. How many proposals were submitted? Is the ratio of proposals to successful applications one that you find satisfactory?

(*Professor Amann*) A very large number of proposals were submitted within the Targeted Socio-Economic Research, I think the total figure was 548, and 38 projects were awarded on that basis. Now, of course, that is a very high failure rate. I would just like to make a few comments on that. Firstly, I think this is the first time that there has been European funding on this scale in the social sciences. It stimulated a great deal of interest, and that is not a bad thing, but our view in the ESRC is that when the call was framed for applications we did not feel that it was sufficiently targeted. It was too broad, and I think it has attracted too many applications. You do, of course, have to see that in the context of very high pressure from high quality applicants for social science funding in Britain. For example, the ESRC at the moment is funding well under 40 per cent of its Alpha rated proposals. There is high pressure domestically on the social sciences. Even when we have tried to focus that more narrowly in some of our research programmes—and I am thinking, for example, of a research programme that we have on "The Learning Society" which invited applications from education researchers—we were there looking at applications which were well over 200 for something like 20 projects which we eventually funded.[1] There is a general phenomenon of high degree of interest and high quality in relation to relatively little funding. Still, I believe that the process of handling applications at the Commission end could be improved and there does have to be better and more thought given to demand management.

246. What would you like the Commission to do? Do you think there should be some form of pre-selection?

(*Professor Amann*) I think they need to introduce perhaps a different mechanism of consultation which at the end of it will produce some more tightly focused research themes. That is the essence of the United Kingdom's submission and advice to the Commission and I think in general terms we would support that.

Lord Gregson

247. The Germans, of course, have criticised all the Framework Programmes as owing more to cohesion than to research. Do you really think that this is a good way of carrying out social and economic research? It is almost doing it by Committee, is it not, if you get a group of people together to carry out this work? It does not sound very productive on the whole. Is it not an expensive way of doing it? Could you not see the much more single minded, single person awards that you make for this sort of thing being a far better way of doing it than having to form a committee to carry out research?

(*Professor Amann*) My Lord Chairman, that is a rather complicated question.

---

[1] Professor Amann subsequently informed the Committee that the exact figures for this programme were: 328 initial applications, 57 full proposals and 12 awards.

Lord Gregson *contd.*]

248. I thought it was pretty straight forward!

(*Professor Amann*) We, of course, do fund through a competitive mode grants competition applications from individuals and we make a judgment about that purely on the basis of scientific excellence. We, together with the other Research Councils, have other modes of funding. We fund large research centres and we fund substantial research programmes which are collections of linked research projects.

249. Carried out by individuals in pieces?

(*Professor Amann*) Yes. Carried out by individuals but within the steered programme. The essence of the matter then becomes how we determine our priorities for those centres and programmes and all Research Councils do this through a process of national consultation. The European Commission is trying to do that with their Framework Programme. The difficulty is of course that it is an international organisation, there are different countries involved, there are legitimate interests I guess, and there is a plethora of international scientific bodies that feel they ought to have to make a contribution as well. Inherently it is a difficult process to manage.

250. And an expensive one by comparison?

(*Professor Amann*) Yes, it is expensive. The consultation must be expensive in time.

251. Time is money surely?

(*Professor Amann*) Yes. But what I am saying is that it is not costless domestically to determine priorities. Whenever you are trying to establish priorities that blend together scientific opportunity and the needs of users then that involves meeting people, talking to people, synthesizing advice and expertise and it all has a cost.

Lord Craig of Radley

252. One of the lessons you say you learned from the Fourth Framework Programme, and referring to the problem within the Commission of co-ordinating and linking together, was that the socio-economic contribution in the Fourth Framework Programme was further weakened by a lack of co-ordination. Have you any specific examples of that that you can point to so we can get a feel for how much of a problem this has been?

(*Mr Caswill*) Perhaps, my Lord Chairman, I could address that issue because I sit on the Management Committee of the Targeted Socio-Economic Research Programme. We have a lot of evidence from within that programme Committee that DGXII, which runs the TSER programme, has rather weak links with, for example, the Directorates General responsible for the economic and social policy, so the content of the TSER programme that relates to social exclusion, for example, seems to have been driven forward without a great deal of consultation and interaction between DGXII and DGV. So the result of that is that the research which is funded in that part of TSER is not of perhaps prime interest and relevance to those who are concerned with social affairs policy in DGV. This, I think, is counterproductive and it leads to an unnecessary dispersion of effort. There are lots of other examples one could give of a similar kind.

253. But that seems to be a generalisation rather than a more specific example. I was wondering whether in your experience you could recall a particular area where this, as it were, hit you between the eyes? Do you have a real example of this weakness as opposed to a general gut feeling? I do not dissent from your gut feeling but there is a problem here. I am just trying to put a bit of flesh on that theme.

(*Mr Caswill*) If I may stick with the area of social exclusion, when the committee and the staff in DGXII have been grappling with how that area three in TSER is to be defined there has been no substantive input from DGV as to what the key issues in social affairs research in Europe should be. The result of that is that when the programme is defined it has a very broad description of the issues of social exclusion and social integration which then do not have the direct connections to policies, so that when the results of this programme are being fed back in their initial stages to the Commission there is no proper audience for it and DGV declare themselves relatively uninterested in that research.

254. Would you sense that there is any difference in definition as between the Commission and yourselves of what is meant by economic and social affairs? It is a very broad field. I am just wondering whether there is a skewed playing field here?

(*Mr Caswill*) I think the Commission is rather a broad church but from my experience of dealing with Commission officials there is a degree of mismatch. Certainly in the early days of the Targeted Socio-Economic Research Programme the area which relates to the evaluation of science and technology policy options was interpreted rather narrowly by the Commission as providing them with some short-term inputs to their interests in technology assessment, whereas the programme is defined more broadly by the Committee and I think by the community of researchers in different European countries. I think there are mismatches. There is this problem which we have identified also in our evidence that the Commission I think sees socio-economic research in many cases as something that they can bolt on at a rather late stage in the process to sweep up some of the issues which they have otherwise not addressed whereas, of course, it is our contention that social and economic research needs to be integrated within the full design of the research programme in a proper multi-disciplinary way.

Lord Haskel

255. In your opening statement you told us that we had 52 awards and in response to the Chairman you said that we had put forward 548 proposals. What happened to the other proposals that did not win? Were they financed elsewhere or did they just lapse? Do we know?

(*Professor Amann*) No. We do not have the evidence for that. What usually happens in these cases is that the effort which goes into an application is not completely wasted because it represents a form of intellectual capital which you can then use for

Lord Haskel *contd.*]

other applications. Of those applications a proportion, although we do not know what the proportion would be, would be funded by other agencies.

Lord Porter of Luddenham

256. Could you give us some indication of the source of these applications in the sense of are there approximately 540 separate research groups which are asking for support or do we have a much smaller number in this country which put in a lot of applications for different subjects? All are presumably tied to research at the European level. 540 good applications at the European level is a very large number for a country like the United Kingdom. I am just wondering where they come from.

(*Professor Amann*) I agree. My intuition too is that the number is too large to be composed wholly of high quality applications. We do not, as far as I know, have evidence about the qualitative break down of the applications that we would produce within our own Research Council.

257. Can I put it this way: roughly how many actual research groups are involved in those 548 applications?

(*Mr Caswill*) The important point to make first of all is that it is 548 applications across the whole of the European Union. I do not have immediately to hand the number of applications that were fronted by British researchers but my guess is there would have been something like 100, something of that kind. Some institutions will have put in several proposals, that is also possible under the rules of this scheme. I suppose if I had to guess I would say that there were probably about 300 institutions or 350, something of that order, across all the Member States making these proposals. As to what happens to them afterwards, we do not have that information. The Commission does not make any effort to track what happens to the applications which fail under this programme, or indeed any of the Framework Programmes.

258. I am sorry, I am a bit confused now about numbers. What was the number for the United Kingdom?

(*Mr Caswill*) I do not have the exact figure.

Chairman

259. Could you write to us? If you do have those figures available it would be helpful to have them in writing.

(*Mr Caswill*) Yes. My estimate would be something of the order of 100 from United Kingdom institutions.

Lord Nathan

260. The impression I get is that DGXII takes a lead in relation to these research projects and what I am concerned about is whether DGXII is equipped with people who have the requisite knowledge in the economic and social affairs context. I came across this problem in relation to DGXI and the environment a long time ago and I came to the conclusion that they were not equipped with scientists who were capable of really understanding the advice on scientific matters which they were being given. It occurs to me that the same thing may be happening in DGXII. Another quite separate point that perhaps I can put to you is that in paragraph 8.1 of your memorandum you refer to evaluation, monitoring, whatever you would care to call it, of the outcomes and there seems to be a notable lack, and I think this is the point you are making, of an evaluation of what has happened in the past, not merely Programme IV but indeed earlier Programmes. I wonder what you feel about that. There are two quite separate questions that I have put to you.

(*Professor Amann*) Our view is that DGXII at present is not able to draw upon the in-house expertise in social sciences that would give it a secure grip over the Targeted Socio-Economic Research Programme. Partly it is a question of scientific expertise but also it is a question of turnover of staff because they have, within a 12 month period, had something like three different Directors and Directorates in charge of a programme. This is not satisfactory. In fact, the level of concern is such that the UK Government's Chief Scientific Adviser wrote to the Commission to express some anxieties about this. If you do not have a substantial call on expertise within the Directorate then it makes it very difficult to have well focused research programmes which are scientifically at the right level. If you cannot do that then there is always the danger that the programme will drift and reach its final shape through a rather *ad hoc* process of political negotiation with lots of outside bodies wishing to intervene and pressing their advice. The lesson to draw from this is that if the Commission wishes to have major social science programmes of this kind—and I do re-emphasise that I think there are considerable benefits for this country in that being the case—then they do need to give some attention to this problem. On the evaluation side, which was the second part of your question, this is more difficult to answer because the TSER is the first major social science programme that there has been and, of course, none of the research has yet been completed so the issue of evaluation in that sense has not cropped up. I do not know if Mr Caswill would like to add anything to that point.

(*Mr Caswill*) Just perhaps a brief word, my Lord Chairman. We are confronted with an attempt by the Commission to evaluate the Targeted Socio-Economic Research Programme and, of course, this is slightly strange because the programme has only just got under way. They are carrying forward the normal routine process of evaluation which is now established. From what I have seen my impression is that the evaluation processes within the Commission have improved. I know that OST has been particularly taking a lead in trying to improve those evaluation processes and has pressed for that improvement. I think the Commission has got a general grip on evaluation but again they are hampered by this lack of expertise.

Lord Nathan *contd.*]

261. Could I just pursue the first question which relates to the second. The evaluation procedure, you say, is better than it might be although it is still not perfect. So far as the capacity of DGXII, and of course we are talking about the Commission, I am only referring to DGXII because they are entrusted with this particular function, what you are saying seems to me to undermine the validity of the programme altogether in so far as the evaluation aspects are concerned, that they do not seem to be capable of dealing with them and they have not got the expertise required. Is this a total waste of money? I put it fairly vigorously because it brings out the point.

(*Professor Amann*) I think it would be considerably improved conceptually if they did have a higher level of internal expertise but of course they do receive some very good advice. The difficulty is reconciling different perspectives and ensuring coherence on the basis of the very good advice that they get. I think that the research has value. From the experience of my own Research Council where we have developed a very well thought out mechanism for determining our priorities, I believe that the quality could be improved by handling the process in a different way.

Baroness Platt of Writtle

262. I must say that your paragraph 1.2 makes rather depressing reading and underlines what Lord Nathan has just said. You say that it would be a good idea to have an external study of the communication and co-operation between DGs and the scope for more effective transfer of knowledge. Would you support the idea of framework funding for that and, whether you would or not, who would do it?

(*Professor Amann*) I would support the idea of framework funding. In terms of framework funding I do not think it would require an awful lot of money. I do not know. A rough figure of something like 200,000 ecu perhaps would be about right. It could be made as a ring-fenced item in one of the programmes. I think it would have some interesting things to tell us about the general issue of knowledge transfer between institutions and how different streams of specialised knowledge are received and acted upon. That is an important issue in contemporary social science; our entire society is one which is based increasingly on the exchanges of specialised knowledge. This would be one particular case study. If I may I would add one point which is tangential to this and focuses on those factors which would encourage an exchange of knowledge between different Directorates in the Commission. I would come back and just remind you of the advice by the British Government which was the introduction of an advisory committee within which the other Directorates would become customers for the scientific programmes that were delivered by DGXII. If you introduce an explicit customer relationship and you incorporate that within an advisory committee which has strategic oversight over the implementation of research programmes then I think it would encourage the flow of knowledge between the Directorates. You do not appear to have a structure to do that at the moment is what I am saying.

263. You might have an advisory committee but who would carry out the external evaluation that you think is so important? Are you suggesting that this advisory committee would do that or are you suggesting somebody else?

(*Professor Amann*) No. I am suggesting the advisory committee is a possible long-term solution which is being proposed by the British Government. Also as a separate question there is a need for research, which was your original question. There are social science researchers specialised in the issues of knowledge transfer who could be called upon to do that at, I think, relatively modest cost.

Lord Gregson

264. I realise that you have probably partially answered this but the Chief Scientific Adviser has expressed formally to the Director General of DGXII his unease about the staffing arrangements in effect. I was involved in Framework Programme I and in those days there was an expert panel available to the staff—it was not DGXII in those days—and the expert panel had the job of vetting consultants who were appointed for specific programmes. That seemed to work quite well. Are you saying that does not exist any longer, that they do not have expert panels to advise them?

(*Mr Caswill*) Perhaps, my Lord Chairman, I could answer that. The Commission, and specifically in relation to TSER this is also the case, has a range of scientific advisers from which it draws advice on specific applications. As Professor Amann has said, one reason why TSER in the end has funded good quality projects is that they have been able to draw on specific peer review advice for those projects. I do not think that part of the process is particularly in doubt.

265. Where is the weakness?

(*Mr Caswill*) In the broad definition of the programme in the first place where the Commission has not had that kind of advice available to it. Where the advice is provided is in providing peer review advice on specific applications and there I think the Commission has had the benefit of good quality scientific advice.

266. In the early days the expert panel's job was in fact to provide that initial advice. You are saying that does not exist any more?

(*Mr Caswill*) I think that the Commission now has broad advice from the European Science and Technology Assembly, that we referred to, and we have referred to their views on the Fifth Framework Programme. I think when it comes down to the definition of programmes it is there, if you like, that the scientific input is perhaps rather more lacking.

267. And they do not have the right any more to appoint consultants to advise them?

(*Mr Caswill*) I think they do have the right to appoint consultants and they do get some advice but I think it is not of the same kind of quality as perhaps you are referring to.

Lord Phillips of Ellesmere

268. I wonder could you tell us what proportion of the social science programmes supported by the framework are in a sense fundamentally social science programmes or are they a part of wider programmes supported by the framework on subjects like biotechnology where there is a social science element in the acceptance of this technology or the introduction of advanced manufacturing technology and so on, all of which have social science elements but they are not entirely social science programmes? Clearly some of the work is of that kind. If some work is purely, and I put it that way, social science, what is the nature of those programmes?

(*Professor Amann*) Mr Caswill may want to add to what I have to say. There are different streams of funding in the European programmes. The most important one, the one that we have spent most of our time discussing so far, is the programme on Targeted Socio-Economic Research. I think the total amount of it is 105 million ecu. That is a dedicated research programme covering mainstream social science areas: science policy, education and training, social integration and exclusion. Those are the three main areas of TSER. In addition to that there are other programmes in the Commission in which there is a substantial social science content. These are programmes in the areas of the environment and transport, for example. Thirdly, in other programmes there is an understanding—actually it is a formal rule—that a small amount of the total funding would be devoted to social science research. The informal figure is five per cent but we have written to you subsequently to clarify the fact that that is not a formal written rule. Now, it is in the comparison of TSER and that latter approach that we see the great advantages of the recent change because where social science is such a small part of the total programme there is the danger that it becomes a sort of scientific afterthought. Social scientists are really being invited to devise ways of making technological developments socially acceptable: whether they are new products, whether it is risk that should be made acceptable, or whether it is food that the public should be encouraged to eat. Our view is that social science can only really make a contribution when it becomes a more substantial and integral part of a larger programme. That is why we think the TSER element within the Framework Programme has been so beneficial.

269. Thank you. I notice in your evidence that you support the OST view, as indeed you do on many occasions, that the Framework V should not be concerned with basic research. I should have thought that as we approach, by whatever route, a more integrated Europe there are fundamental questions in our knowledge of the behaviour of society which will need to be investigated in the European context. Do you see no role for that in the Framework Programme? Surely that is a European issue rather than a national issue?

(*Professor Amann*) Yes, my Lord Chairman. I must confess to being rather torn here because my understanding was that the European Commission itself did not fund basic research as such; its purpose was to fund research which would contribute in some sense to its own objectives. The kind of research that is funded is, I suppose one might call it, strategic research. In our case it is not concerned with company decisions as such, or Government policy, but establishes the intellectual basis upon which sensible decisions and policies can be based. That provides a great deal of interest for social sciences. It is more difficult perhaps in the social sciences to try to define precisely what blue skies research is in the way that it would be understood in the natural sciences. I think within the sort of research that I have tried to describe there would also be plenty of scope, and certainly we as a Research Council have advocated it, for studying European institutions and dealing with the challenge of the enlargement of the European Community and the addition of countries from Central and Eastern Europe. Indeed this is my own field of research. That is perfectly within the scope of a future Framework Programme I would argue.

270. I take it from your remark about basic research that strategic research, which I may remind you was a category invented by Lord Dainton, a Member of this Committee, some many years ago is part of the spectrum of various topics. Your exclusion of basic research suggests to me that you still heretically adhere to the linear model of development in some respects.

(*Professor Amann*) Well, my Lord Chairman, as the Chief Executive of the Research Council that I hope has done more than any other institution in Britain to undermine the linear model of innovation I could not possibly support that view. I certainly would not subscribe to the linear model. I suppose my difficulty is just a pragmatic difficulty—we realised this when we gave advice through the European Science Foundation—of asking the Commission to fund research which within their terms of reference they were not going to fund. We felt that in giving our advice we had to indicate to them the kind of economic and social benefits which would be a consequence of that research. The reality is that in the social sciences many of those questions, indeed most of those questions, which we would want to investigate are basic research in our terms.

271. But if the Commission says it does not support basic research you are perfectly happy to call it strategic research?

(*Professor Amann*) Yes.

Chairman] In one of your earlier answers to Lord Phillips, you did refer to the size of the social science research element within the framework and I wonder, Lord Haskel, if you have got a question on that?

Lord Haskel

272. Yes, my Lord Chairman. You were kind enough to write to the Committee to correct the impression that there was a five per cent rule. You called that an informal maximum. Do you have any thoughts as to whether there should be any formal or informal amount, and if so what it should be?

(*Mr Caswill*) My Lord Chairman, I think the nub of our argument is that having any kind of small bolt-on additional sum of this kind simply does not do justice to the issues. I think in a sense we would not really want to venture an opinion on whether it

Lord Haskel *contd.*]

should be three per cent or five per cent. Our argument is simply that socio-economic research should be incorporated centrally in the design of multi-disciplinary programmes to address issues such as, for example, information society, rather than having a programme and technological research with a small proportion at the end which seeks to address some rather tricky issues which emerge as afterthoughts.

Lord Craig of Radley

273. Going back to lessons learned from Framework IV, you talked about the content of TSERs shaped by a series of quasi-political negotiations and you suggest that in Framework V we must avoid this and go more for "a programme of work which is both policy relevant and organised on a proper scientific basis." Perhaps you could tell us a bit more about your concerns about the Framework IV issue, perhaps even by starting by defining what you mean by "quasi-political negotiations" in order to help us understand what you are trying to avoid?

(*Professor Amann*) Yes, my Lord Chairman, I shall try. In a nutshell the process is something like this. You begin with potentially 16 national views about a future Framework Programme. There are typically long meetings of officials in Brussels which generate further proposals. All the major scientific bodies in Europe contribute their advice in such a way that you can observe a sort of ritual dance of deference, so to speak, around the Commission with visions of future research being expressed very eloquently. There is a certain degree of horse trading that goes on both inside and outside DGXII. Then, to add yet further complexities there are direct interventions by Member States who want to ensure that their own interests are enshrined in any future programme. The simple point we are making is that these conditions are not optimal for the development of a scientific programme but all of them are to a degree an inherent part of an international body. They are views that have to be taken into account. The real issue, therefore, becomes that of an appropriate mechanism for representing these views but containing them within a framework that could be used to develop a coherent programme of research. It is not just a problem for the Commission, it is a problem nationally. All the Research Councils face a similar task. We also have different interests and needs to reconcile. Lots of stakeholders, lots of scientific views have to be reconciled in order to determine priorities. We have developed mechanisms for doing that. It may be early days for the Commission in the social science area but our view would be that they will have to devise a mechanism which will encourage a more considered view of the scientific content of programmes.

274. You believe that to be an attainable objective, do you? I think your comparison between national bodies within a single nation and internationally where the pressures, as you have outlined, come on very much more strongly, is not a very fair comparison because in the real world you are going to be left, are you not, to live with these quasi-political inputs? You are looking for some method of containing that. Do you feel that you can go further than that and come up with something which is right scientifically even at the expense of some national bodies?

(*Professor Amann*) Yes, my Lord Chairman, I am in no doubt that it would be difficult but one should not under-estimate the power of conflicting lobbies in British science policy; they are also factors which have to be reflected upon and contained. This would be more difficult. Simply having a situation as at present where advice from different very influential bodies is lobbed into the Commission and processed in a rather *ad hoc* way as far as we can judge is not optimal. I am pretty confident that the consultative process could be improved with some common sense.

Lord Craig of Radley] With some sort of credibility rating of the various participants!

Lord Soulsby of Swaffham Prior

275. Somewhat related to the last question from Lord Craig, could I refer you to your paragraph 2.2, to the last few sentences there where you say: "It will also be important to allow the best European scientists to have a share in the shaping of the research." Then you go on to suggest that will explicitly leave space for the creative contributions of the scientists. The first part of my question is do not the best European scientists already have an opportunity to input and shape research? If not, should they not be there in your scientific advisory groups and the rest? I am puzzled by that sentence. It implies that the best European scientists and their brains do not shape research.

(*Professor Amann*) The point that we are making here is one which relates to a different kind of balance. We have been talking so far about balances between countries and perhaps different stakeholders and Directorates. The question that has now been raised concerns the balance between a central vision for the development of science and the creative response of the scientists themselves. Again, it is a problem that we have nationally as well as internationally. Essentially what we are arguing here is that in the Fourth Framework Programme the TSER covered very wide ground but in the practice of its specification it was often detailed to the point where it restricted the creative freedom of the scientific creativity. Our preference would be for thematic priorities at the European level which would be more tightly focused as themes but more open-ended to the creative response of the scientific community. The more you specify centrally the more you are confident that you can anticipate what the real scientific opportunities are and the more you can go down a slippery slope that actually leads in the end to a body like the USSR Gosplan. There has always got to be a proper balance. Our view is that it may have gone a little too far in the first attempt at TSER in getting down to excessive levels of detail.

276. Then you go on to suggest that this could be done by leaving space for the creative contributions. I am just interested to know would that be physical space on the application form in one sense? How would that be done? How do you perceive that?

Lord Soulsby of Swaffham Prior *contd.*]

(*Professor Amann*) It is the way in which you describe your priorities. It is not just leaving a space on the application form. It is a way of describing your priorities at a sufficient level of generality and encouragement so that the applicant looks at that general specification and can then think laterally what it actually means to them in terms of their scientific expertise; the responsibility then rests with them to see how they can contribute to that general theme. The more you specify the more you take away the freedom for the scientist himself or herself to decide how they can contribute.

277. I am glad to hear you say that because I would have thought the evaluation of a proposal is based on a number of things including innovation and time limits, which is part of what you are saying I think.

(*Professor Amann*) Yes indeed.

278. But suppose this creative contribution was in fact what you say is basic research, which you do not support, which Lord Phillips took up, what would you do then? Would that be detrimental to the proposal or not, if it was indicated that in a certain area both innovatively and timely one had to go into the basic aspects?

(*Professor Amann*) I think you just treat the application on its merits, my Lord Chairman, as we do in ESRC. In a sense I am responding to the question through personal experience. We have thematic priorities which could very well be an approach also used by the Commission. They are quite focused. They are a signal to the research community of the general area in which we are seeking to encourage applications. Then we leave it to them to see how they will respond to that. Some of the ideas which come forward could never have been anticipated by a Research Council. How could you possibly anticipate all the ideas that might come from the scientific community? Some of those proposals may be very far removed from particular policies or decisions, which would be our equivalent to new products and new processes. I think you have to be flexible as a Research Council and having stated your priorities you should then be open to the scientific community and the way in which they respond to those priorities.

279. So it is not as tightly bound as this paragraph would suggest? There is a fair amount of leeway for the scientist to put his innovative thinking into the proposal?

(*Professor Amann*) Yes. There is some, my Lord Chairman, but our thinking is that there should be some more.

Chairman] I am going to have to press on because we are near the end of our session. Lord Porter has a quick question.

Lord Porter of Luddenham

280. You have referred in your evidence to the support in general from the Commission for the social sciences which obviously you feel is a very good thing. Would you go so far as to follow them in their very forthright statement that Framework V should concentrate on social objectives rather than world-beating technologies with commercial potential? That is really putting the cat among the pigeons or whatever it is, is it not?

(*Professor Amann*) We were absolutely delighted, of course, to see the priorities expressed in that way. We take the view that that is the right way of expressing them. It again comes back to the notion of a linear model of innovation. This is the opposite of the linear model. It is starting off with social and economic needs and using those as the basis for thinking about future scientific and technological developments. You would not be surprised that representatives of an Economic and Social Research Council would be attracted by that particular approach. It is one that we have not seen very often in many of the previous European documents but I do believe that an approach that is driven solely by technology, and a very narrow view of technology which was characteristic of some of the early thinking of the Commission on FP5, would miss some of the critically important problems of Europe which I believe are economic and social. We were happy to see this new statement of priorities although, of course, in no doubt that successful innovation and a focus on technological development are also crucially important.

281. If you had an application which was clearly world-beating with commercial potential would you exclude it if it did not have social implications?

(*Professor Amann*) Personally no. I think that would be an inflexible and foolish thing to do.

Chairman] I think with that note we will have to leave that question there or I suspect we are going to open up a very wide discussion on it. Lord Phillips, did you want to ask a question about attribution? This must be the last question I fear.

Lord Phillips of Ellesmere

282. With your permission, my Lord Chairman. You seem to have taken question 11 as a question of attribution but it is capable of another construction. To what extent do Framework Programmes provide, say, university research workers with the full economic costs of their research? To what extent do these workers have to get funds from elsewhere to supplement the European grant? To what extent does that cut into their ability to engage in other work?

(*Mr Caswill*) I think it is clear that the Commission does not provide full economic costs and it is clear that there are, therefore, costs which are placed upon the British universities and other institutions that apply and are successful in gaining funds from the EU. I am sure that it must be the case, therefore, that there are ways in which European funding is eating into the existing infrastructure of British universities. I think the question of the extent to which the Commission and the Framework Programme are prepared or able to provide at least something more generous in terms of the real costs of research is a major issue.

283. It is often claimed that other European countries supplement the resources provided by the European Union so that this phenomenon does not occur in other countries. As far as you know is that the case?

Lord Phillips of Ellesmere *contd.*]

(*Mr Caswill*) In our own particular area we certainly know that in some cases countries take the view that having secured resources from the European Union is in some sense a measure of scientific quality so they feel justified then in adding additional resources from their own baseline funding. That would have the effect that you are describing. I am sure that they would describe it in slightly different terms.

Lord Craig of Radley

284. Does that work in the opposite sense in that the Commission is encouraged to support a particular programme of work because that programme of work has already attracted national funding? Is there an insidious process going on?

(*Mr Caswill*) Again based on the evidence in our area I would believe that most of the people who apply to the Framework Programme and are successful can only do so because they have been able to secure some previous funding from their national systems.

Lord Phillips of Ellesmere

285. If I may turn to attribution, since you picked up the question. I am not aware that over the years Research Council budgets have been formally decreased as a result of attribution. Money attributed to the science budget has always been made good by the Secretary of State in deciding on the overall budget so that the Research Councils have not directly felt any impact from attribution. Why then do you say that it "may have the unintended consequence of reducing the quantity and quality of UK inputs to debates on the Framework Programme"?

(*Professor Amann*) My Lord Chairman, we were thinking about the inputs made by Government departments rather than OST and other Research Councils. Given the risk of attribution the issue becomes whether departments facing the possibility of attribution would be inclined to be enthusiastic about research which had a very powerful cross-departmental character.

Lord Phillips of Ellesmere] Yes, I do understand that. Thank you.

Chairman] Thank you very much. I must draw this to a conclusion, I would not wish to encroach on the time of another Research Council! Thank you very much for the help you have given us today. You have, I think, promised to send us further written evidence on the number of United Kingdom applications. If there is any further evidence that you would wish to submit in writing as a result of this session today please do so. Thank you very much for your help this morning.

Further Supplementary Letter by the Economic and Social Research Council

I am writing to supply the additional information which the Select Committee requested on UK applications to the first Targeted Socio Economic Research Call for Proposals in the Fourth Framework Programme. The number of applications involving UK researchers was 99, remarkably close to the estimate of 100 which we gave. In 23 cases, UK researchers took the lead and, as you know, 13 of these 23 have been funded. This is a very commendable success rate of 56.5 per cent. From the total of 99, 52 were funded (52.5 per cent).

I would like to take this chance to reiterate that many of the successful applications are from individuals or teams which have won awards from ESRC in our own open and very competitive processes, and we believe that this first Call has funded a great deal of high quality research. As I hope I made clear at the hearing, we believe this to be the result of the large pent-up demand for resources for comparative social science research on European issues, and of the peer review advice given to the Commission from the UK and elsewhere. It does not obviate our concern about the ability of DGXII to handle social science research effectively, particularly when defining research needs.

If I may, I would like also to return briefly to the distinctions between basic, strategic and applied research. In our written evidence we supported the OST view that the Framework Programme should not fund basic research. At the hearing, I believe I also made it clear that in some cases these distinctions are not particularly meaningful for us, but perhaps I did not say enough about why that should be.

We have always believed the Frascati distinctions between applied, strategic and basic research to have limited classificatory power for the social sciences. ESRC does not support much work which could be described as basic theory; the subject matter of almost all our awards are institutions, policy processes, and human behaviour. In general, much of this is most comfortably classified as strategic or in the new category of "oriented basic" which ESRC recently introduced along with other Research Councils.

Others, including some academic researchers themselves, might argue that this same research is curiosity-driven and therefore basic. However, these are finely-shaded differences and my point is that arguments about the boundaries are often pointless, or even counter-productive, in our field. The ESRC position is that the strategic label covers our interests and the interests of those social scientists likely to wish to apply for EU research funding.

I would be grateful if these further comments could be drawn to the Select Committee's attention.

Professor Ronald Amann

12 December 1996

Memorandum by the Biotechnology and Biological Sciences Research Council (BBSRC)

BACKGROUND

The Biotechnology and Biological Sciences Research Council (BBSRC) provides (with DTI) the UK National Contact Point for the Biotechnology Programme (Biotech) in FPIV and plays an active part in the Whitehall Coordination Group for the three Life Sciences programmes (Biotech, Biomed and FAIR). BBSRC also has a wider interest in the Framework programme because there are opportunities for life sciences related RTD in at least 11 of the 15 specific lines of the first activity of FPIV and in activities two, three and four. Our role in developing UK input to Brussels is advisory. We provide a route through to the scientific community to give advice on eg the scientific means to address policy needs and research best done on a European scale.

BBSRC contributed to the preparation of the OST written evidence to the Select Committee, with which it is in general agreement. The following focuses in particular on our experience of the Biotech programme.

1. *What lessons should be derived from the Fourth Framework Programme?*

The proportion of the Framework budget devoted to life sciences rose substantially between FPIII and FPIV. The allocation for Biotechnology rose from 2.8 per cent to 4.4 per cent (an increase in cash terms from 186 MECU to 552 MECU). This increased emphasis is consistent with the Commission's white paper on competitiveness which identified biotechnology (with IT) as the key competitive technology of the coming decades. The EC Framework is thus successfully avoiding perpetuating past funding distribution and is responding to the scientific opportunities provided by the life sciences both in relation to competitiveness and quality of life.

The programme content and the administration of FPIV are better than in FPIII. There still needs to be tighter focus of work programmes in the Life Sciences programmes to ensure that effort is concentrated on the key objectives of importance at European level (and to avoid wasteful over-subscription). The evidence, eg with sequencing of key genomes in Biotech, is that tight focus on clear objectives can be extremely effective.

Coordination between the Life Sciences programmes and with other relevant programmes (eg Environment; Industrial and Materials Technologies) could be improved. In particular there is a need to ensure that the potential for technologies developed in one programme to address industrial or policy objectives in others is not inhibited by mismatches in work programmes, call dates etc. For example, there needs to be adequate provision for developments in the Biotech programme to contribute to aspects of crop and livestock improvement which are priorities in FAIR, to environmental remediation objectives in the Environment programme etc.

The placing of dissemination into the separate Activity 3 is not optional. Actions within specific programmes would be more effective. The development of industrial platforms in the Biotech programme has been a good example of this. There could be more funding within individual projects to enable researchers and their institutions to promote their findings and interact with industry, the public etc. Similarly, there is an argument for greater association between the specific programmes in Activity 1 and the training and mobility activities in Activity 4.

2. *Should there be a FP5? What should be the main objectives and focus and how should priorities be set?*

There will continue to be a case for research to promote industrial competitiveness, quality of life and social cohesion which can most effectively be addressed at the European level. Biotechnology will continue to be central to this activity.

The focus of EU activity should be on work which gives added value at European level and complements (rather than replaces) national activity. Added value may be gained by Biotech by, for example, bringing exceptional coordinated effort to bear (eg genome sequencing), enabling more rapid progress in highly competitive areas (eg structural biology, neurosciences), developing coordinated facilities (eg bioinformatics) or by bringing research and industry together across national boundaries in key strategic sectors (eg cell factories, environmental biotechnology).

In developing advice for OST on the content of FPV BBSRC gave particular attention to the interaction of its own priorities and those of the Technology Foresight exercise with the current priorities in FPIV and identified a number of areas where EU action will give particular added value. In summary our conclusions were, for the Biotech programme, that subject to adequate focus:

- there was a case for continuation of some activity under each of the current lines, particularly in cell factories and genomes.
- there was a case for targeted development of the current small activities in structural biology, neurosciences, vaccinology and environmental biotechnology.
- the current predominance of plant research in the plant and animal biotechnology line might be readjusted in favour of more animal research.
- there needed to be greater emphasis on gene function and on intracellular communication processes.

We also concluded that a good case existed for focused new initiatives within the Life Sciences in the areas of diet, health and nutrition and ageing.

3. *What should be the balance between basic and applied, precompetitive and near market research funded through a Fifth Framework programme?*

The Framework should not have as its objective the support of basic research, but it should seek to bring forward the technologies needed for European industry to maintain and advance competitiveness and to address quality of life and European policy needs.

The anticipated pervasiveness and competitive importance of biotechnology, and the rapid transfer of innovation to market, justifies support of generic research in key areas.

4. *What should be the role of Task Forces in a Fifth Framework Programme?*

The Task Force on Vaccines & Viral Diseases developed useful conclusions on European priorities for research. We endorse the OST view that the best features of the Task Force mode of working need to be incorporated into FPV.

5. *Can it be demonstrated that the UK gets clear value for money?*

Objective measures in this area are very difficult to obtain partly because of the lack of clear information on national success from the Commission. BBSRC has confidence in the value of work done in Biotech for the following reasons.

- successful UK applicants include many of our grant holders and senior institute scientists and, as far as we can judge, the standing of partners from other countries is similarly high.
- BBSRC nominates evaluators to the programme from its own committees etc. Feedback from them about the standards and propriety of peer review in Biotech is favourable.
- the science is generally focused on areas acknowledged to be of key importance.
- the evaluation of Biotech in FP III (chaired by Dr Paul Christou from the John Innes Centre) was very positive about the overall quality, relevance and efficiency of work done.
- the return to the UK is consistently above *juste retour* with a high proportion of UK coordinators.

6. *Joint Research Centre*

There is negligible JRC activity in the Biotech area. We do not believe that the JRC should move into any new areas of activity until it is able to compete on open and equal terms for funding for its current activities.

7. *Cohesion and SMEs*

The participation of the "cohesion countries" in the Biotech programme does not cause a significant problem. Evidence from the management committee and from evaluators is that scientific standards are not compromised in order to include participants from less-favoured regions.

The arrangements to assist participation by industry and particularly SMEs need to be more flexible and take more recognition of the variations in the nature of the user industries. For example, high-tech SMEs in the pharmaceuticals sector are able to play a full partner role in collaborative research projects. At the other extreme, the vast number of European SMEs in the food industry are dependent upon research developments in eg packaging, preservation and safety for both product innovation and regulatory compliance but have no capacity to participate directly in research. Different mechanisms are needed to engage these different user groups.

8. *Commission expertise and mechanisms*

The quality of information and the effectiveness of its dissemination by the Commission has improved significantly. There is still a need to improve the openness of evaluation, simplify application processes and speed up the evaluation and contract procedures. Scientific staff are used to performing routine administrative and clerical tasks and there is insufficient knowledge of the corresponding structures and procedures in member states. This suggests that DGXII would benefit from a more appropriate balance (within existing administrative costs) between scientific and support staff and more staff with a background in science administration.

9. *Length of Framework*

We feel that five years is about right and that the fixed duration is necessary to enable regular assessment and redirection. This accords with the maximum duration for which we approve an individual activity nationally without fundamental reassessment.

The negotiation procedures need to be organised more effectively to eliminate some of the peaks and troughs in funding and activity which punctuate the progress of successive Frameworks and make the achievement of long term goals, such as the completion of the genome sequencing, less easy.

10. *Task forces and earmarked funds*

Task force led activities should not be funded outside the context of specific programmes. It is important that they are integrated into related research activity.

11. *How should the UK allocate funding for the Framework Programme?*

We share the view expressed by others that an incidental consequence of the attribution policy of HMG is to reduce the quantity and quality of inputs to discussion on the Framework programme in its key, early stages, as departments fear the financial consequence of suggesting new ideas.

Examination of witnesses

Professor Raymond Baker FRS, Chief Executive, and Dr Vicky Harrison, Director of SPSAIG (Science Policy, Scientific Assessment and International Group), Biotechnology and Biological Sciences Research Council, called in and examined.

Chairman

286. Can I welcome Professor Baker and Dr Harrison. I think, Professor Baker, this is the first occasion on which you have given evidence to us in your new post as Chief Executive of the BBSRC. Could I first of all congratulate you on your appointment. Dr Harrison I think is familiar with the Committee, she has given evidence before. Is there anything, Professor Baker, that you would like to say by way of introduction before we embark on the questions that we would like to ask?

(*Professor Baker*) Thank you, my Lord Chairman. We have submitted some written information and I would not wish to spend too much time on an opening statement because there are many questions that I understand would flow from that. First of all, I think I would note the welcome increase in the emphasis in successive Framework Programmes on life sciences and biotechnology. That has increased from Framework II to Framework IV from something like two per cent to 4.5 per cent and that is good. On Framework V, the Commission is looking to give increased recognition to life sciences and biotechnology. Two of the topics which have been identified are unlocking the resources of the living world and the ecosystem, and promoting competitive sustainable growth is the other one. I think I would say that that is good because of the success that we can point to in the biotechnology programmes which have taken part in Framework IV and its predecessors. There are some real successes which have flowed from that and we may wish to discuss those in some detail at a later stage. The genome work has been spectacular. Not all of it, of course, has flowed from Framework IV but support from Framework IV has given an impetus to that work. The full sequencing of that yeast genome which is 6,000 genes is an extraordinarily important event both for our economic future and for human health developments in the pharmaceutical industry and elsewhere. Although yeast is not man we have much to learn essentially from this genome. It is much smaller but the knowledge gained can then be applied into the human genome with good effects. Could I also refer to the work of Louise Johnson in Oxford who is looking at aspects of carbohydrate recognition and control by glycogen phosphorylase and other enzymes of carbohydrate metabolism. The studies could lead to important developments for the

Chairman *contd.*]

treatment of diabetes and other diseases. Coming into agriculture just briefly and the tomato plant in particular, the introduction of bacterial genes into tomatoes has resulted in significant increases of carotenoid production and an increased health value within the vegetable. This results from the increased production of vitamin A which arises breakdown of the enhanced carotenoids. These really are events which I would wish to point to and then just to mention what the BBSRC's role is in all the Framework Programmes. We are, of course, advisory to delegates essentially and can provide an input into Brussels and into the determination of the programme. We have a representative on the management committee. Dr Harrison here is part of that committee[2] and she can consult with all the delegates essentially on that programme. What we do provide is a route from our community into Brussels and we have, of course, through close associations with all our scientific programmes and the individuals who are concerned with them, a role in the nomination of experts who may well serve on those peer review committees. The practice of peer review and assessment, which I hope that we do as well as anyone, is important. Once programmes are running, once they are established, then we can provide the publicity and the help for those programmes to our own community and pass on that advice which enables them to take part in that issue. These are some of the few comments that I would like to make, my Lord Chairman.

287. I am most grateful to you, Professor Baker, for those introductory observations. Could I then start by asking; you say in your memorandum: "...a good case existed for focused new initiatives within the Life Sciences in the areas of diet, health & nutrition and ageing." Do you feel, therefore, that the biological sciences and biotechnology need a higher profile within the Framework Programme?

(*Professor Baker*) I think it needs a higher profile because this is an area from which economic success can certainly flow. I do not think anyone would doubt that in the age of the 1990s and through into the next century the massive advances that are taking place in biology and biological sciences has been like nothing I have seen in my career. These spectacular changes and events which are taking place in our understanding of biology need essentially to be reflected throughout this nation and throughout Europe which will provide people with the training and the experience to take part in programmes which will lead to economic success.

288. You make a very convincing case, convincing to me anyway but perhaps I am a bit biased, on the importance of the biological sciences and the various successes that have come out of the programmes you have mentioned. Does it nevertheless have to be a European Union Framework Programme given that you heard the evidence earlier from the ESRC and given that there is clearly some concern about the management of these programmes? Would there be a simpler way of achieving the collaboration across Europe which is sought?

(*Professor Baker*) I have to admit to some self-doubts so some of the comments I make need to be read in the context of that. I do wonder sometimes at the increased bureaucracy which essentially one has to overcome for funding in this way, but nevertheless I think if we turn to one or two examples, if we may do, it is not possible for this nation to fund the extent of the work on the genome, not the human genome but other genomes in plants and animals, without reference to the rest of the world and to Europe. Now, of course, we can take note of what is happening in North America and in Japan, and in some ways we are in competition, but then it is much better for the effort in the United Kingdom to have some effect from Europe and a symbiosis with Europe. The net effect of a fund which essentially places grants both in the United Kingdom and in other countries and enables those collaborations to go forward does carry our research forward rather more rapidly.

Lord Gregson

289. I thought the genome programme was a world programme without competition, or it was supposed to be. I attended the first Council meeting and that was an absolute principle.

(*Professor Baker*) Yes, my Lord Chairman. The human genome is without competition. The genomic programme that worries me and my council is the genomic studies which are taking place both in animals and in plants. Let me give just one or two examples. The senescence gene, which has been discovered in Aberystwyth at one of our research institutes, is a most important event. That discovery will lead not only to keeping our lawns greener or football pitches greener for a longer time, which of course is advantageous to some people, but to the application to crops both in nutrition and in the longevity, the freshness of those crops and the ability to store those crops for longer periods of time. I have made a case for those studies in the plant and now I should say why it is important that it goes on here rather than in North America or in Japan. It is important to recognise that intellectual property is a delicate and important matter. Essentially we would not wish this country or Europe to be blocked from developments by intellectual property being taken from countries overseas. That is a real danger if we rely on the advance of knowledge outside of this country or Europe. We need to protect ourselves for the future in maintaining a momentum in intellectual property. That intellectual property involved in inserting the gene into a tomato plant or wheat or peas or any other plant that is there is important and we are, in our institutes and universities, taking that intellectual property which can be directed in certain directions.

Lord Phillips of Ellesmere

290. You made a point, Professor Baker, about the importance of the genome activities but in my recollection your arabidopsis programme, for example, involved close collaboration supported by the National Science Foundation and the United

---

[2] The Biotechnology CRN.

Lord Phillips of Ellesmere *contd.*]

States with an institute or university in St Louis, it also involved collaboration between the John Innes Centre and the Max Planck Institute in Cologne. The yeast programme, which had a large Framework Programme element of support behind it, also involved groups in America as well. I wonder what is the added value of the framework involvement in, say, the arabidopsis programme?

(*Professor Baker*) I think you have really referred to a point which is very relevant. There is no question that that work is generally important as a major model in our understanding of the genome in particular. That would essentially fall in line for me alongside the human genome work. In this case this is a classical model for plants that I would put alongside the human genome. The influence and the things which flow from that are very much worldwide in very much the same way as the human genome. So there is nothing in particular other than the model and the teaching that it passes on to the other work that I referred to.

291. So there is rather little Framework Programme added value that you can point to?

(*Professor Baker*) In that case but not in the smaller studies which then takes that work and applies it further to plants and to animals, looking into the genomes of the pig or chicken. It is important for our pig growers to be able to predict the consistent size of a litter in commercial production, therefore the knowledge that is going into identifying the trait which governs the litter size and the information which is passed across from the genomic studies in the yeast or the human is important in that direction.

Chairman

292. Does Dr Harrison want to add something?

(*Dr Harrison*) Simply to say that I do not think we would claim that this is the only way that the work could be organised, but that *someone* needs to organise it. I think in relation to these particular genome studies that we have mentioned, the Commission has organised it very well. There have been involvements of other countries, the United States, Canada and Japan, but the Commission has taken on the work of organisation very successfully.

Lord Gregson

293. Would you say that it is a cost-effective way of organising it or could you devise a somewhat better way that would not waste so much money in co-ordination or instructing smaller countries in the work of it?

(*Dr Harrison*) International collaboration is more expensive always than doing science nationally. It is very difficult to make a comparison in relation to the genome studies. The Commission has a programme up and running in biotechnology and within the funds allocated for biotechnology they have undertaken this work and it seemed to be appropriate work for them to be involved in.

294. Is it cost effective compared with other ways of organising it? It is a very expensive programme.

(*Dr Harrison*) I think we have not got a basis for comparison.

Chairman] Did Lord Phillips want to come back on genome studies?

Lord Phillips of Ellesmere

295. If I may, my Lord Chairman. Professor Baker made something of the interest in long life tomato, in my understanding that is something of considerable interest to major food companies who have made considerable progress through collaboration no doubt with university groups on this front themselves. What is the role for the Commission in that activity?

(*Professor Baker*) I think, my Lord Chairman, the role of the Commission is to encourage and provide further support for those events which do translate into economic reality. Lord Phillips, I think my reference to the tomato was not only the long life tomato which is part of the market now essentially in some ways because of the nutrition in that. New plant varieties which flow from that will be grown and provided from Europe rather than elsewhere. I think the Commission's role in that is to encourage and foster that activity.

296. I suspect, with respect, these major companies that I am talking about need no messenger from Brussels to tell them how important that is.

(*Professor Baker*) No, my Lord Chairman, they do not need messengers but consistently they seem to need money. If we could persuade them to fund to the extent that all of us—you and I particularly—would wish them to then no money from Brussels would be needed at all.

Lord Porter of Luddenham

297. Following all that you have been saying, you have given some very convincing examples of the importance of plant research and I was interested in your recommendation in that connection for the biotech programme that the "... predominance of plant research in the plant and animal biotechnology line might be readjusted in favour of more animal research". All the examples you have given of success so far pretty well have been in the plant world.

(*Professor Baker*) Thank you, my Lord Chairman. It does seem to me, as relatively new to the job in the Research Council and looking at the results of work which we have seen over the last few years, that naturally the advances in the plant area have been in advance of those in the animal kingdom. Therefore I think this is probably a natural event in that early work has been in plants, enormous success and advances have been made there, and now I think it is slightly more complex to work in animal organisms. That is following on from what we learnt from those early studies. Also, of course, we see growing problems with animals in different directions and it would be of great advantage to continue that work. In a way I think it is a natural progression.

298. You say "naturally", why do plants naturally come before animals? Is it that higher plants are simpler than the lower animals?

Lord Porter of Luddenham *contd.*]

(*Professor Baker*) I think, my Lord Chairman, some of the plants are a little simpler and the ability to work on those, the facilities essentially which one needs, are slightly easier also.

Lord Haskel

299. Perhaps you agree with the proposition from the Parliamentary Office of Science and Technology, and I quote from their paragraph 6.8: "... a regulatory directive in biotechnology could more than outweigh the benefits of framework funded R&D"?

(*Professor Baker*) That is a most interesting question and I think it is one that all of us are exercising our minds on at the moment. Let me step back a moment or two if I may. It is quite clear to me at least that in North America there is a wider acceptance of technological advances made as a consequence of science and a more ready acceptance of products which arise from that research. The case, of course, which is very much to the fore currently is the question of growing soya beans from modified crops. The problem with this country and the problem with Europe is that our consumers are very much more sensitive to the uncertainties that lie ahead essentially than maybe is North America for some reason. Whilst there has been ready acceptance of soya bean in North America that has not been quite so here, although of course our procedures will allow soya bean to be sold. The lobbies which are growing in strength are pointing to the fact that we do not track soya bean growth in the modified crop and we cannot track because of essentially the way it is grown and the way it is harvested and the way it is put together with other crops, you can track it no longer. Certainly Germany and Austria may well be much closer to banning all North America soya bean, I do not believe this country is at that stage yet. Zeneca, together with Safeways, did what one might describe as a marvellous job in getting tomato paste grown from modified tomatoes accepted by the public by very hard work and two years of trailing the information. That is the background to your question I think, the acceptability by our consumers, by our nation, for products which no scientist can say "can be totally safe in the future" because there are unknowns. At the same time then, we are funding research which is evolving these developments in their own right. I have referred already to both pigs and tomatoes and other crops. Our research is leading towards those developments. Will our directives then prevent us applying those to the benefit of the public? This is the tension between these two.

300. How would you then apply this regulatory regime to encourage more ready acceptance of these progressive inventions?

(*Professor Baker*) My Lord Chairman, I would say I am not a politician so I would expect our own representatives to press strongly for modifications to those directives to allow the benefits of the research to apply for our own good and our own economies in Europe.

Lord Gregson

301. It is more a social science problem than a scientific problem, is it not? Maybe we should refer to your previous colleagues who were sitting where you are sitting.

(*Professor Baker*) I think, my Lord Chairman, I would disagree with that. I do not think it is. I think it is a scientific problem but the understanding of science—and Vicky may want to comment on that—which is part of our responsibility is a very delicate matter. It is a matter in some ways in that as scientists or representatives of scientists we cannot harangue our public by saying: "Of course you do not understand this but I can tell you essentially that this is okay, this is fine, this is quite safe". It is quite extraordinary to notice the parents of a Downs Syndrome baby, once the baby is born, in that at the beginning of the life of the child the parents probably know nothing whatsoever about Downs Syndrome but in a period of two weeks parents have gone to their own general practitioner and told him or her about the details of that disease. The ability of an individual to take on board the depths and understanding of science should not be underestimated. In a way that is my answer I think, Lord Gregson, to your question. I think there is an understanding which one can make known.

Lord Phillips of Ellesmere

302. I am sure you would agree, Professor Baker, that a very large proportion of the things we eat have been improved over very long periods by traditional breeding processes. It does not seem to me at all obvious that changes introduced by so-called genetic engineering actually differ from those which might be brought about by traditional plant breeding procedures. Could that not be a scientific approach to explaining to the public what is going on?

(*Professor Baker*) I am afraid that I would disagree with your remark. I agree essentially on the first part of it, that effectively what we have seen in evolution in plant breeding is the same process but there is a control mechanism which is placed on that which is not placed on genetic modification and that control mechanism is time. What is happening now is that this process is very much faster and speeded up so we do not have the time to assimilate and we are not doing the experiment to allow time to elapse to see whether there is an effect on the population.

Chairman] I think I had better refocus on the Framework Programmes and Lord Soulsby has a question.

Lord Soulsby of Swaffham Prior

303. My question is to some extent to do with what we have just been talking about. Of course you may remember that there was a Select Committee on Science and Technology enquiry on regulation of biotechnology which concluded that in the United Kingdom and in the European Union it was much more over-regulated than in the USA, in fact over regulated in industrial and economic development. My main point is connected with that. To what extent have United Kingdom biotechnology SMEs

Lord Soulsby of Swaffham Prior *contd.*]

benefited from the framework funding because so many of these are marginally in existence financially? You say in your corporate plan that: "Over 100 biotechnology small and medium enterprises have emerged from the science base in the United Kingdom...". Have you any idea how many have emerged from funding from the Framework Programme?

(*Professor Baker*) I think maybe Dr Harrison may want to comment.

(*Dr Harrison*) I think that few SMEs are involved in the EC biotechnology programme. There are new measures that have been introduced in the Fourth Framework to try to encourage the participation of SMEs by giving them exploratory grants so that they can work up proposals. I think there is a fundamental difficulty in that some SMEs simply do not have the technological expertise to take part in the research programme and really what they need is to be involved at the dissemination stage. I think more flexibility is required in the way in which the Commission involve SMEs. In terms of the numbers of SMEs involved in the biotechnology programme at the moment, the numbers are very small but more of the SMEs involved are from the United Kingdom than from any other country. I think this is largely due to the fact that the DTI actually appointed a consultant to help SMEs here to participate.

304. Many of them do not have the manpower in order to take advantage of these Framework Programmes, would you agree with that?

(*Dr Harrison*) I think there is a whole range of different SMEs. At one end of the spectrum, perhaps in the pharmaceutical world, then they are able to be involved, at the other end of the spectrum there are SMEs who need to know about food packaging, that sort of thing, in order to pursue their work but where clearly they cannot take part in the research itself. But the outputs of the research are of value to them and in some cases there would be advantages to an SME linking with a large company.

(*Professor Baker*) If I may add, Lord Chairman, a comment to that. My own observation has indicated that small companies are growing now rather more readily than they have done ever in the past and we are seeing the benefits. I can think of one example which probably flows from the biotechnology programme and that is the breeding of sheep in Edinburgh, sheep which have been genetically modified to produce a protein, which is a therapeutic protein. That is a direct result of the work we were discussing earlier this morning and that is a small company, a new company, which is going to be successful. There are examples of companies flowing from that but it is early days yet.

305. Again, coming back to regulation of biotechnology, when we took evidence on that it was clear that quite a number of SMEs would rather go across the Atlantic to the US to do the work because of the regulatory framework that they were working in compared with the European Union.

(*Professor Baker*) I think that may be due also to the ready availability of capital.

306. Absolutely.

(*Professor Baker*) And the environment in North America which readily speculates capital in these directions; that is changing to some degree. We have seen, in the last two years, that the availability of venture capital in this country has increased and we may look to the future and see that they may stay in Europe rather more than in North America.

Chairman] We are in danger of taking evidence for the other sub-committee now which is doing an enquiry into seed corn venture capital funding.

Lord Phillips of Ellesmere

307. You made an important issue, Professor Baker, quite correctly, of the importance of intellectual property. I should declare an interest as a director of a biotechnology company. To that company the development of its own intellectual property which is licensed out then to other companies is extremely important. To what extent will that be compromised if these companies actually collaborated in the early stages of their work with other companies, particularly large ones perhaps? Your own sheep development in Edinburgh presumably relies heavily on intellectual property that was generated with the support of your research council?

(*Professor Baker*) I think your question is difficult for me to answer. Intellectual property is a topic which all of us look to. I have many concerns and one of the concerns I think is in direct contrast to the point you are making, that is the economic benefit, and that is the exclusivity of intellectual property. It is more of a concern to me than actually concentrating it with companies like that.

308. I did mention licensing out.

(*Professor Baker*) Yes, licensing out is absolutely important. Licensing out is still fairly restrictive in terms of the return that one gets on it. I would hope that there are many general pieces of intellectual property which are offered then on a non exclusive basis, not without funding, not without return on capital but without the ability to select certain individuals to take on board that development. In some ways I am for non exclusivity, an economic return on licensing out, but the restrictions which flow from that and the patent law sometimes make it difficult for people to advance.

Lord Craig of Radley

309. Could we turn to the user friendliness of the Framework Programme to the research community? Dr Harrison mentioned that the Commission was very helpful when it came to organising the genetic studies. On the other hand, we have had a number of criticisms that some of the negotiations are very quasi political in nature and also criticisms of the arrangements within DGXII, particularly when they are trying to make the best co-ordination of scientific advice or administrative advice. I wonder whether you see the Framework Programme as user friendly and if not, where would you like it to be corrected?

(*Dr Harrison*) If I may respond. I think that the procedures have improved quite significantly over the last two or three years and that the Commission

Lord Craig of Radley *contd.*]

now produce documents of greater clarity. It is much easier to get information directly from the Commission. They are more transparent in their procedures but there are still aspects that need to be improved. I think two issues that we are concerned about still, particularly, are the length and complexity of the procedure from the time that applications are submitted, or indeed from the time there are calls for proposals for applications. The Commission are taking this very seriously. Madame Cresson arranged a meeting in June this year to look at the management questions which concerned people. Our previous Chief Executive, Professor Tom Blundell, was one of the two representatives from the United Kingdom at that meeting. They focused in particular on how they might reduce over subscription, and how they might reduce the time taken from decisions about giving an award to the issuing of a contract—which has been an area where there have been lots of complaints. In relation to the contract process, the Commission have targets now which, if they manage to implement them, I think will improve the situation a lot. In relation to over subscription I think the options for improving the situation come down to focusing the programmes (and probably that is the most important factor) or possibly in addition the Commission looking at pre-proposals so that the applicants do not have to put forward a fully worked out proposal without encouragement to do so. They have tried that in a couple of programmes. I think it worked quite successfully in the information technology area, it did not work very successfully in the biomedical area; but probably there is scope for more experimentation.

310. By "focusing" can you describe what that word means to you? Are you talking about narrowing the field?

(*Dr Harrison*) Yes.

311. What about value for money in this process? Do you feel there is any way of measuring value for money?

(*Professor Baker*) I think, my Lord Chairman, it is still early days for that but I think we should note down as Framework Four comes to an end, the things which have flown from that particular programme. Certainly we should track ahead into Framework Five. If I may, my Lord Chairman, maybe I could make a comment to your previous question which was the problem of application and success, the success rate. In biotechnology, because it has been rather more focused, the success rate is around about 20 per cent. That success rate, dare I say it, is the equivalent to what we have in our own Council which I think is too low personally.

312. By "success", success in getting—

(*Professor Baker*)—getting the grant from the application.

313. As opposed to success as an outcome of research?

(*Professor Baker*) Yes, I was just going back to the previous question. There was an additional point that I wished to make, if I may. That point is that with a success rate of 20 per cent, we do need to look ahead to see essentially if the mechanism can work better and there are two ways to look at that. One is whose time are you saving essentially in a failed or successful application? The office can do the calculation of saying: "We have not saved any time by asking for initial proposals as requested and then having full proposals". So in some ways this mechanism has fallen into disrepute perhaps, but I think that what has not been taken into account is that there is a young man or young woman who sat and worked for five weeks, generating a research proposal which has then been turned down. Much better had he or she spent one week putting in an outline proposal, and had been given encouragement then to go further. This is a complex issue and both Dr Harrison and I are looking into this in great detail to see if we can suggest better ways of doing it in our own Council and then apply that into Europe.

Lord Gregson

314. In Europe you spend a lot more time looking for collaborators than you do in a failed proposal, do you not? You have to find smaller countries because that is how the Commission blesses the proposal in the first place.

(*Dr Harrison*) If I can respond to that, my Lord Chairman. I think a lot of the applications build on existing links. The scientists already have contacts with colleagues in Europe and they build on those links possibly bringing in one or two additional countries but not necessarily one of the smaller cohesion countries. There was a stage when it was said that in order for your application to be successful you must have a country like Portugal involved but that is not the case now really. Certainly it is not our experience of the biotechnology programme. The cohesion countries are brought in when it is appropriate. It is the scientific quality of the work that is paramount and we are not concerned that the aims of the Community to improve cohesion actually diminish the quality of the scientific programme.

Lord Porter of Luddenham

315. If we could look at European science for a moment, apart from the Framework Programme. Could you tell us what benefits your Research Council, the BBSRC, derive from participation in other programmes: European Science Foundation Programme for example, the European Agricultural Research Initiative, EURAGRI, and the European Co-operation in Science and Technology, COST?

(*Dr Harrison*) The European Science Foundation, we have had a longstanding association with and we have advocated often their methods for networking across Europe which have originated in a bottom up fashion and also have involved what we have described as an *à la carte* process. That is when the ESF have announced that there was going to be a new programme in some area, such as developmental biology, it was up to each country and each participating research council within those countries to decide whether they wanted to be involved or not. So we were able to go to our research committees and say: "This is what it will cost, in competition with the

Lord Porter of Luddenham *contd.*]

national proposals that you have in front of you, do you wish to take part in this ESF programme?" From our perspective this was a very satisfactory way of being able to reach decisions on international and European involvement.

316. Do you describe the Framework Programme as *table d'hote* in that case?

(*Dr Harrison*) Certainly it is not *à la carte*.

(*Professor Baker*) My Lord Chairman, if I could comment on EURAGRI, that is a European forum which allows agricultural ministries and agricultural research organisations to exchange views, I think that is very important. Its main activity, which is relevant to us, has been to develop a case for European action on diet, health and nutrition. So there has been a beneficial flow from that organisation.

Chairman] I think we ought to ask you about the Joint Research Centre and Lord Soulsby has a question on that.

Lord Soulsby of Swaffham Prior

317. Do you consider that the JRC should continue to receive funding by top slicing funds otherwise available for competitive bids?

(*Professor Baker*) That is an important question. Of course, the JRCs are not directly in the area that we represent but we have clear views on the future way that they should be dealt with and that is that they should be compelled to submit in competition with all the other bids going in and I would not wish for the process to be continued with top slicing. We are moving into selectivity in all our developments in science and technology and I think they should be submitted to that normal competition.

318. Once you establish something like the JRC you imply almost you have to have a continuing funding to keep it going otherwise you are going to go up and down according to the quality and the success of the proposals that come in?

(*Professor Baker*) That question touches on our own institutes in this country and, of course, the suggestions that we may change the arrangements for their existence. We have publicly funded research institutes in the United Kingdom and that is the subject of Prior Options. It is quite possible—and I am not giving any view this morning—that these institutes could stand on their own feet but then they would be placed in the same competitive environment that we are suggesting JRCs are. So Babraham, for example, might succeed in that competition and all the other institutes along with it would be asked to compete. I do not give a personal view, I do believe that some of these institutes and JRCs may have some value, should have an element of core funding which gives them that continuity. Without that continuity there can be mission drift, mission drift meaning that they can be distorted from the central feature and the importance of the work by having to earn money in some areas. So there is a very fine balance.

Lord Gregson

319. What about aid drift which is a famous syndrome of publicly funded research centres? If you are not attached to university you cease to get uplift of student entry and student relationship. That was why the Americans more or less stopped funding publicly funded research and insisted they attached themselves to universities.

(*Professor Baker*) I see some value if an institute is close to a university of course then there is some value being attached to that university. The institutes that I can think of now, there are more young people in them than one might expect. I do not think I have seen that phenomenon in the United Kingdom.

Lord Phillips of Ellesmere

320. Staying with the JRCs, Professor Baker, the name makes it sound like some monolithic institute somewhere but of course we all know there are seven constituent institutes distributed in five different countries which gives the whole organisation, presumably, a good deal of political support across the Community. Four of these institutes are engaged in research in nuclear physics to some extent, does that not suggest that the United Kingdom might be arguing for a Prior Options review of the need for this organisation?

(*Dr Harrison*) I wonder if a sort of Prior Options review has not been undertaken already through some of the committees that the DGRC is involved in?

Lord Phillips of Ellesmere] It is not being done very publicly is all I can say.

Chairman

321. The Commission put in written evidence, and we will be seeing them later, on the subject of the Joint Research Centre, saying there is a need for in-house expertise in order to further policy objectives. Does that sound convincing to you or do you think it could be done by other research institutes and universities who are not in-house? The facility that the Commission believe is valuable which the Joint Research Centre provides, that facility provides in-house research which they believe is necessary in order to advance policy decisions.

(*Professor Baker*) I do not think, my Lord Chairman, I would accept the Commission's view in that case. I do not think they need that to develop their policies and it would be better if it were done more independently I think by people they call on from time to time.

Lord Phillips of Ellesmere

322. I understand, Professor Baker, there is one programme which may be of interest to you, fairly recently introduced, into alternatives to animal experiments. Is that the sort of research which the Commission ought to be conducting in support of its own policy on such issues or would that be better contracted out to other agencies?

Lord Phillips of Ellesmere *contd.*]

(*Professor Baker*) Well, my Lord Chairman, I am aware of that and the importance essentially of the topic that you introduce but we have an excellent organisation in this country called FRAME which attracts public support, private support too, and I would have thought that those organisations are just as capable of advancing the technology needed in developing assays which depend on tissues rather than whole animals. In a way I do not even think that will be necessary for the Commission to do.

Chairman] Professor Baker, we have run out of time. I am sorry about that. Nevertheless could I say to you and Dr Harrison how grateful we have been for your help today and thank you very much indeed.

TUESDAY 3 DECEMBER 1996

Present:

Butterworth, L.	Platt of Writtle, B.
Craig of Radley, L.	Porter of Luddenham, L.
Gregson, L.	Selborne, E. (Chairman)
Haskel, L.	Soulsby of Swaffham Prior, L.
Nathan, L.	
Phillips of Ellesmere, L.	

Memorandum by the European Commission

WRITTEN QUESTIONS

1. *What targets are being set for the simplifications of contracts procedures, shortening of deadlines and hastening of payments made through the Framework Programmes?*

The main areas where consideration is being given to improving the management of research programmes include the following:

REDUCING THE LEVEL OF OVER SUBSCRIPTION

Currently, only some 20 per cent of proposals on average can be selected for funding. The aim is to improve success rates through (i) concentrating programmes (targeting calls for proposals on more precisely defined parts of the work programmes, concentrating programmes on fewer and/or more focused objectives); (ii) giving more detailed information regarding proposal eligibility conditions and evaluation criteria; (iii) extending the use of "pre-proposal checking" of project outlines.

INCREASING THE TRANSPARENCY AND CONSISTENCY OF THE EVALUATION PROCESS

Although steps were already taken in 1994 and 1995 to improve the process, feedback indicates a need for increased transparency and consistency between programmes. Steps being taken to respond to these demands include (i) drawing up of improved guidelines for evaluation based practice; (ii) the publication of a general manual setting out the principal steps and procedures, supplemented by programme-specific evaluation manuals setting out the individual programmes' criteria, marking systems, etc in detail; (iii) the participation of independent observers to follow the evaluation process of programmes; (iv) a more transparent system for the nomination of independent experts, including the publication of calls for nominations.

LIMITING THE TIME NEEDED FOR THE EVALUATION PROCEDURE

In 1995 most programmes took between four and five months between the closing date of the calls for proposals and the evaluation decision by the Commission, although this was longer for some SME specific measures and the fellowships and networks of the Training and Mobility of Researchers programme. Through progressive improvements in internal procedures, the objective is to reach a formal evaluation decision within a period of not more than four months after the closing date of the calls for proposals (three months for SME-specific measures and TMR fellowships). The possibility of giving early feedback to coordinators on whether their proposals have received a sufficiently high score in the evaluation process to make them eligible for consideration for funding is also being investigated.

RATIONALISING AND LIMITING THE DURATION OF CONTRACT NEGOTIATION AND FINALISATION

In 1995, negotiation and finalisation of contracts took between one and four months depending on the complexity of the projects and the time taken by the contractors to finalise arrangements between themselves. The objective in the short term is to rationalise the process of contract negotiation through the definition and publication of harmonised guidelines and to limit the duration to two months in normal circumstances. This should lead to a progressive reduction of the time between the closing date of the calls for proposals and the dispatch of contracts to not more than seven months for most projects, six months for CRAFT projects and three months for SME exploratory awards and TMR fellowships.

FINANCIAL ASPECTS OF PROJECTS

Payments to contractors are almost invariably made in less time than allowed for in the model contract, but the transfer times between members of a project consortium can lead to contractors experiencing much longer delays in getting paid. There has been a significant improvement in the internal processing time for such payments within the Commission in the latter half of 1995. In particular, advance payments are now often processed within one to two weeks following the contract signature. In addition, a new actual cost contract with payments in fixed instalments offers the possibility of simpler and shorter processing for intermediate payments. For the longer term, there are still some possibilities for reducing administrative requirements on contractors which could be explored (eg the use of composite rates of financial contributions that do not require the checking of overheads or contracts based on payments linked to achievement of objectives).

SME SPECIFIC ASPECTS

Experience has shown that the participation of SMEs depends on the information, advice and assistance that is provided to them by the various organisations operating at national and regional levels. An increase in the support of Member States to their CRAFT networks is a necessary condition for improving the participation of SMEs in EU programmes and, in addition, the Commission will ensure closer coordination and links between different European information networks. Action is being taken to reduce the proposal evaluation time for SME-specific projects to not more than three months and the time between the submission of a proposal and the sending of the contract to six months for CRAFT projects and three months for exploratory awards. To increase the flexibility of the scheme for SME-specific measures, it is envisaged to evaluate proposals for exploratory awards more frequently.

2. *Some of our witnesses have expressed a desire for more flexibility in the start date of research contracts. How might this be achieved?*

There is indeed a considerable degree of flexibility in the start date of contracts. The normal procedure is for work to start on projects the month following contract signature. This is the case for the majority, but by no means all contracts, as it is possible for the contractor to agree with the Commission a specific start date at the time of contract negotiation, with the proviso that this must not be a date prior to the approval of the contract by the Commission's financial controller. In practice, many contracts are subject to specific agreed start dates, up to a year beyond the time of contract negotiation.

3. *How will greater dissemination of research results be achieved to ensure that the widest possible use is made of them?*

It is accepted by the Commission that efforts to stimulate optimal exploitation of research results by their owners, and to promote the transfer of these results when those who have carried out the research cannot or fail to exploit them, should continue. Efforts to improve the diffusion of research results, starting already in FP4 should focus in particular on:

promoting links and cooperation between universities/research organisations and industry, in particular SMEs;

encouraging technology transfer along the supply chain in particular between large companies and SMEs;

other specific measures which will also contribute to a better exploitation and diffusion of results are being put into effect by the Commission. These, include modifications to the terms of contracts (ie IPR arrangement, diffusion requirements) technology brokerage events, follow-up of the RTD projects to identify, two to three years after the end of the contract, results which are not exploited and could be transferred, etc.

4. *Does the United Kingdom system of funding attribution cause any problems for example in negotiating the Framework Programmes or in their operation?*

The EU's Framework Programme is funded through its general budget. There is, therefore from the Commission's point of view, no sense in which national contributions to the framework programme are earmarked. Moreover, the way in which each Member State approaches questions on national funding are, essentially, matters for that Member State. As the Commission understands the United Kingdom system, however, it is intended to ensure that Government Departments take a close interest in the application of Framework Programme money. The UK position is nonetheless expressed for the UK as a whole, so as a purely practical observation, the Commission would not expect to be made aware of any problems which might arise. A key point of principle remains that, in accordance with Article 130g of the Treaty, the funding which is allocated to Community RTD is for activities which complement those carried out by Member States. By that token, a Community research activity should not lead automatically to a matching cut in activities in Member States.

5. *Given the need to satisfy Member States requirements in the Framework Programme, what account is taken of the advice from IRDAC and ESTA?*

In the development of the Commission's proposal for the Fourth Framework Programme a step by step approach is being followed, to allow industry, the scientific community, and other interested parties the opportunity to make their views known at each point in the process. So far, the Commission has indicated the principles and types of criteria which will be applied in drawing up the framework programme.

The detailed research content of the framework programme proposal is still in the process of being defined by the Commission. In this process, the Commission's own analysis will be supplemented by many suggestions which have been provided by industry, trade associations, research funding bodies and so on, as well as those of the Commission's advisory bodies, including, IRDAC, ESTA and CREST.

It should be noted the IRDAC and ESTA exercise their advisory role at different levels and with varying degrees of formality. One level is that of submission of formal opinions. However, Commission staff are very often associated with the preparation of IRDAC and ESTA opinions and own-initiative reports, thereby providing a channel of informal information to the Commission departments. ESTA and IRDAC-nominated representatives also participate in various seminars and working groups organised by the Commission, such as the management seminar held in June 1996.

6. *How might greater flexibility be introduced into the programmes so that they can adapt to new avenues of research, and abandon unfruitful lines, within the lifetime of a Framework Programme?*

The need to make the programmes more flexible and improve the Union's ability to respond to unexpected scientific and technological developments or unforeseen problems is self-evident and has often been stressed. It would be impossible to predict at the beginning of a four year Framework Programme all the major needs that will manifest themselves or all the possible developments during the period covered.

There are two aspects to the issue of constant adjustment of Europe's research efforts: the real-time monitoring of developments and the response adjustment mechanisms:

Real-time monitoring of scientific and technological developments and the development of societal and industrial needs can be achieved by stepping up the "Technology Watch" activities and establishing closer links between those activities and the activities under the programmes. Needs, particularly in terms of additional targeted activities, could be analyzed continuously on the basis of evaluation and monitoring reports and regular consultations with industry, the scientific community and users.

A rapid and flexible response could be ensured by various means, in particular:

- regular adjustment of the programmes, ideally on an annual basis;
- the provision of a "free space" of limited scale, and subject to strict rules, specifically to respond rapidly to needs that were not originally foreseen.

It should be noted that the limited number of programmes is in itself an important factor making for greater flexibility. However, the existence of adequate mechanisms is not enough to guarantee effective flexibility—there must also be a political will to use the mechanisms.

7. *With the need to ensure that only high quality science is funded, what scope is there for Structural Cohesion funds or research fellowships to be utilised so that less advanced nations are able to develop their research infrastructures prior to full participation in the Framework Programme?*

The EU Treaty establishes a clear separation of roles between the Framework Programme and the Structural Funds regarding the actions related to Research and Technology Development. The RTD Framework Programme finances high quality trans-national research projects of community interest, while the Structural Funds finance RTD related actions contributing to local, regional or national development.

This means that it is primarily the responsibility of the Structural Funds to help the Less Favoured Regions in Europe to strengthen their RTD capacity. This is achieved through the Operational Programmes of the Community Support Framework by financing infrastructures, equipment and training for research and innovation. During the period 1994–1999, 7,200 MECU will be dedicated to this kind of investment or around 5 per cent of annual structural Funds' expenditure.

The Framework Programme helps the Less Favoured Regions to access the best European and world research through participation in its specific programmes. The recently published Cohesion report of the Commission has shown that the Less Favoured Regions are improving their level of participation in the framework programmes, and that they do very well in relation to measures of their research potential, such as the number of researchers per 1,000 inhabitants. Moreover, the so-called cohesion countries are among the first to recognise that the benefits are largely due to their participation in projects and programmes of real scientific and technical quality.

With regard to fellowships, as with all framework activities, proposals are selected for funding according to strict criteria of scientific excellence, although a proposal involving a less favoured region may be preferred above another without such involvement if the scientific quality is equivalent. In addition a specific instrument known as "return fellowships" provides assistance for the reintegration of researchers of less favoured regions who are already working abroad into their home region, so as to encourage a "reverse brain-drain".

8. *What is the level of political input to project selection after proposals for funding have been identified by the selection committees?*

Without going into all the details, it may be helpful to outline the selection process as it will be clear that the scope for "political input" is very limited. The fundamental principles governing selection of proposals are equality of access, equity of treatment, high scientific and technological quality, and impartiality of judgement.

Implementing these principles requires rigorous procedures involving a number of stages. There are in fact no "selection committees" as such. The Commission administrates the framework programme and is therefore responsible for the selection of proposals. To make its selection, the Commission relies on "evaluation panels" which are composed of independent experts and which give their opinion on the quality of the proposals received in relation to the relevant criteria, according to a strict marking system. The experts are drawn from a list composed of nominations by Programme Committees and other competent bodies, and they are duty bound to declare any interest which might colour their judgements. The short list of proposals drawn up by the Commission is based on the final rating, but also takes account of factors such as the available budget, the need for a balance in the achievement of objectives set out in the work programme and the avoidance of unnecessary duplication of effort.

The selection process is subject to the overview of the programme committee, consisting of representatives of the member states, which has the power to reject the Commission's proposed selection. However, in view of the fact that proposals, by definition will include participation of teams from several member states, it would be extremely difficult for member states to influence the process to their advantage alone. It is moreover the practice of the Commission to provide feedback to all proposers. In the case of rejected proposals, this would include the reasons and the opinion of the evaluation committee.

The Commission is making efforts further to improve the clarity of its selection procedures, and is preparing a set of manuals which describe the process in very precise terms. These manuals will indicate the method of evaluating proposals, including the criteria which are applied and the marking system, so that proposers can carry out a "self-evaluation" prior to submission. Although the main document, which gives the general approach, will not be published until early next year, the Commission is able to provide manuals applying to two of the specific programmes Environment and Climate and MAST (see attached).

9. *What, if any, problems arise in the inter-relationships between the different Directorates General in relation to research and the Framework Programme?*

Effective inter-Directorate-General liaison is very important to the management of the framework programme:

Community research activities are managed mainly by three Directorates-General: DG XII (Science, research and development) which is responsible for the framework programme and for the administration of the majority of funds, DG III (Industry), administers the Information technology programme under the 4th Framework Programme and DG XIII (Telecommunications, Information market and exploitation of research) administers the ACTS (telecommunications) and Telematics Applications programmes, as well as the programme on dissemination and exploitation of research ("Innovation programme"). Other Directorates-General (VI-Agriculture, VII-Transport, XIV-Fisheries and XVII-Energy) are involved to a smaller extent.

The Joint Research Centre now has the status of a separate Directorate-General.

As "customers", the majority of Directorates-General have an interest in the programme.

Budget matters and expenditure under the framework programme are overseen, as with other areas of Community expenditure, by DG XIX (Budgets) and DG XX (Financial Control).

Generally speaking, co-operation and co-ordination between Directorates-General works well. As would be expected, the majority of contacts are at working level, but there are specific procedures, such as "inter-service consultations" for formal co-ordination. These are for example mandatory in the presentation of proposals for adoption by the Commission, and would thus cover such matters as the texts for calls for proposals and decisions on the selection of proposals. In addition, the Commission's research-industry task forces are a specific mechanism which has been established to reinforce co-ordination in particular areas.

As regards the preparation of the Fifth Framework Programme, the Commission has organised a series of informal but effective "working groups" associated with key topics, involving all the relevant departments of the Commission. These working groups have been responsible for the development of particular "building blocks" which will provide one set of inputs to the Commission's eventual proposal.

10. *What are the current staffing levels in support of the Framework Programme, its management and administration?*

DG XII's statutory staff (ie Permanent officials, Temporary Agents and Auxiliary Agents) amounts to about 900 at the present time. In addition, DG XII employs some 200 interim staff, most at secretarial level. A copy of DG XII's organigramme is attached.

11. *What is the breakdown between the level of participation of firms in the Framework Programme and their size? Has there been any change in these figures in light of the new SME initiatives?*

The 1996 Annual Report of the Framework Programme, COM(96)437, provides figures on participation for 1995, the first year of implementation of FP4. Tables, 5A and 5B of the 1996 Annual Report on the Framework Programme (attached) give the precise figures for each type of participant. The number of SMEs participating in 1995 was 1,782, giving a relative share of 20 per cent compared with 17 per cent in 1994. In 1995 SMEs took 15 per cent of the Community's contribution to RTD.

In the course of the Third Framework Programmes, the CRAFT scheme tripled the number of SMEs participating in the research projects in the Industrial and materials technologies programmes. Another 3,500 SMEs received exploratory or feasibility awards.

In the Fourth Framework Programme, the CRAFT formula has been extended to seven other programmes. Participation by small businesses has increased, particularly in the specific programmes on Telematics Applications, Information Technologies, Standards, Measurements and Testing, Environment and Climate, Biotechnology, Biomedicine and Health, Agriculture and Fisheries, and Non-nuclear Energy. 1,782 small firms participated in the shared-cost activities under the Fourth Framework Programmes in 1995.

However, it is still recognised that the current level of participation by SMEs in European research must be improved. A working party responsible for inter-programme co-ordination of implementation of the technology stimulation measures is addressing this subject.

12. *What proportion of firms involved in Framework Programme IV were also involved in previous Framework Programmes?*

On the basis of the contracts concluded up to 4 June 1996, under the IV FP the number of participants (only counted once, so independently of the number of contracts in which they participate) was 2,280 of which 858 (or 37.6 per cent) had never participated before.

Per member state the number of "newcomers" is:

AT	BE	DE	DK	ES	FI	FR	GB	GR	IE	IT	LU	NL	PT	SE	OTH
34	27	147	29	58	39	91	106	20	7	76	3	36	23	69	93

Per category of participants, the picture is the following:

GRD	SME	REC	EDU	OTH	INT
207	443	114	31	62	1

GRD = large enterprises, SME = small and medium-sized enterprises, REC = Research Centres, EDU = Higher education institutes, OTH = Other, INT = international organisations.

It is interesting to note the very large number of "SME-newcomers". The picture is evidently some what coloured by the participants of the three new member states but even for the "12" the percentage of "newcomers" is still high: 33.5 per cent. This seems to suggest that"newcomers" are not scared off by the "complexities" of the system.

13. *How was it decided that the programme to develop a means of avoiding the use of animals in experiments should be a JCR activity rather than something that could be put out to tender?*

The European Centre for the Validation of Alternative Testing was created by the Commission in 1991 (see Communication to the Council and European Parliament SEC(91) 1794 of 29 October 1991). The Commission decided to establish this Centre within the Joint Research Centre as the function of validation of alternative tests needs to be executed by a neutral body independent from the national public and industrial laboratories which are involved in the development of alternative tests. The validation of alternative tests is directly linked with the legislative functions of the Commission in the field of chemical, cosmetics and pharmaceuticals.

List of Attachments (Not Printed)

1. Evaluation Manual for Environment and Climate, and MAST programmes.
2. The 1996 Annual Report of the Research and Technological Development Activities of the EU.
3. DG XII organigramme.
4. Communication from the Commission to the Council and the European Parliament on the Establishment of a European Centre for the Validation of Alternative Methods (CEVMA) [SEC(91) 1794 final].
5. Communication from the Commission to the Council and the European Parliament on progress in the implementation of the Council conclusions of 26 April 1994 on the role of the JRC.

Examination of Witnesses

PROFESSOR JORMA ROUTTI, Director-General, and MR RICHARD ESCRITT, DG XII, European Commission, examined.

Chairman

323. Can I welcome you, Professor Routti, and Mr Escritt, to this meeting of the Science and Technology Select Committee in the House of Lords. We are grateful to you for giving evidence to us today. You will know that we have one or two questions to ask of you on the European Framework Programmes, particularly the current fourth, and perhaps we might refer back to previous experience of earlier Framework Programmes and, of course, we would like to look forward to the fifth Framework Programme which you are discussing with interested parties. I do not know, Professor Routti, whether, before we start with one or two questions, you would like to make any opening observations?

(*Professor Routti*) Thank you, my Lord Chairman. The Commission very much welcomes the opportunity to be present here. This is a very good time to discuss the next Framework Programme. We are just in the middle of the planning period of the next Framework Programme. It will actually be discussed in the Research Council this week by the research ministers of the member countries. The Commission has already communicated to the Parliament and Council of the European Union the policy orientation paper prepared last summer. It was formally communicated to the Parliament and Council on 15 September and has already been discussed by the Research Council and also in the Parliament. We are now, of course, defining the programme in more detail.

The plan of the Commission is to prepare a working document in full length early next year, then a formal proposal to be submitted to the co-decision process involving the European Parliament and the Research Council, a process which takes about one to one-and-a-half years. This timetable is needed for us to launch the next Framework Programme at the beginning of 1999. The policy orientation paper, which is the principal material we have available today, plus a supplementary working paper which will be communicated to the Research Council, addressed the general questions about the structure, priorities, and the main elements or building blocks of the Framework Programme. We are, of course, basing this new programme on the experience of the previous programmes. There are evaluations in progress of all specific programmes and then evaluation by an evaluation committee chaired by Mr Davignon of the whole Framework Programme. We have invited and received contributions from all Member States, from interested parties right across Europe, from our science and industrial advisory bodies, ESTA and IRDAC, and, of course, we have consulted quite intensively with CREST. That is a committee of national key civil servants on the science policy side.

I think it is fair to say that the current Framework Programme is a good one; the evaluations have been quite favourable. Our intention is to maintain the excellence in science and technology which Europe without question has, but there are new challenges that we would need to address in the Framework Programme. We need to find better avenues and instruments to couple with excellence in science and technology to the economic and social benefit of our societies and I think one can identify a number of directions where interactions, which are two-way interactions, are leading. Commissioner Cresson, who is in charge of the research programmes, has very much emphasised the needs of society, the concerns of the citizens, as the guiding principles for research programmes. These questions relate to employment, job security, physical safety,

Chairman *contd.*]

environment, education, welfare systems and so on. Another avenue is industrial competitiveness, which is very much affected by research today—more and more every day and increasingly in the future. In that area the Commission has introduced new concepts, new management tools called task forces, and they will have a role in the next Framework Programme.

There is a need also to address the questions on the policy side. Questions such as climatic change, the greenhouse effect, call for attention by scientists and our feeling is that the scientific world has to go further than today to integrate the research findings into policy alternatives. It is then, of course, up to the policy-makers to choose what policies to adopt, but it is very important with these very complex issues to try to estimate the cost-benefit impact. So this again is something which calls for more co-ordinated action than we have today.

Then there is a very interesting challenge of creating infrastructures for knowledge-based industries and economies whose structures are very different from traditional industries. Just to put the numbers in perspective, the European Union budget is about 90 billion ecus a year; it is 1.27 per cent of the Member States' GNP. So compared to the United States or Japan, of course, it is a fairly small amount as it is when compared to that of the EU's member countries. Out of that budget, one half is the Common Agricultural Policy, that is, about 45 billion ecus a year. About 30 per cent are structural funds which have the political objective of social and economic cohesion, but these instruments also relate to infrastructures, and, of course, there is every interest to use also structural funds to advance questions related to science and innovation policies, and we already see that this makes a significant contribution. It adds about 50 per cent to the EU's science funding. Research is part of the internal policy item of the EU budget. Internal policies represent about 6 per cent of the European Union budget, and out of that, science and research and development is about 60 per cent. So we have about 3½ billion ecus a year. This is about 4 per cent of the European Union budget. It is also around 5 per cent of the total public investments by member countries in science and research and development. Its impact is larger because all our projects do have a national contribution and usually an industrial contribution. So in terms of the overall impact we are talking about maybe 15 per cent of total public R&D investments. In terms of impact, the share is even larger because we tend to select the most interesting topics, the most promising areas. It is difficult to give an exact number there but it might be in the order of 20 or 30 per cent.

This however means that the question of subsidiarity is important at the European level. It is important to define what we need to do together and what is best done at national level. If one looks at the history of European collaborative research, one can see that many areas are such that only common efforts are possible. The very expensive facilities needed for space research, particle physics, the European Southern Observatory and the like, have called for joint action, which has been typically organised in separate organisations. But also on the science side there are many issues which must be addressed, and can only be addressed, by common action. At the environmental side, global change, the greenhouse effect, the Mediterranean, the Baltic, the River Danube, the Rhine, are questions which cannot be addressed within the shores of a single country. Mapping of human genomes involves thousands of scientists in European universities and research centres. So there again interaction is needed.

One should also emphasise the value-added in many other fields. The European landscape of the university research world is rather fragmented. We typically have small teams which have a hard time competing in today's world, where you have very competitive teams in the United States, Japan and many other countries. So the value-added comes with access to a larger pool of knowledge. If one decides to invest a certain amount of funds in one's own country then one can be sure that one can employ scientists and get equipment for that amount of money; but then one also has access only to that amount of knowledge and typically this knowledge pool is maybe too small to be competitive, while working together we can provide access to a knowledge pool which may be 10 or 20 times larger. So even a small country which might be paying 2 per cent of the Community research funding can have access to 20 or 30 per cent of the results, and the bigger countries of course, through participation in more projects, to a bigger share.

The structure of the next Framework Programme tries to be responsive to all these challenges. What we have today is a Framework Programme which is probably too fragmented. It consists of up to 20 separate programmes and there are about 10,000 projects going on at this time. We cannot solve all the problems at the same time. We want to have a large number of participants in these programmes but we want to have more co-ordination.

We also need to have more flexibility than we have today. The heavy co-decision process will freeze many things for many years ahead. It is difficult to be responsive to the needs of new threats like BSE, to the opportunities like World Wide Web. It is very useful to have the time horizon of five years for the execution of the framework programme because most of the things cannot be accomplished in a very short time, but there has to be flexibility to be responsive to new needs. The Commission is seeking this flexibility by having a smaller number of programmes with larger spheres. So the policy orientation paper defines three thematic areas and then three horizontal activities. Thematic areas relate to life sciences and ecosystems, on the one hand, and information technologies, including telecommunications and telematics, on the other, and thirdly, competitive and sustainable growth. There are also horizontal programmes which relate to international co-operation, interchange of scientists and researchers, and the particular questions related to SMEs and innovation systems.

In many fields, if for example we take life science, the common scientific basis today is rather unified. Every field in life science must be addressed by the molecular biology/genetic studies level. Also, in information technologies we can see the integration of telecommunication and computers, and competition in today's marketplace is, to a certain extent, between the personal computer and the

Chairman *contd.*]

network computer. So there again a more integrated approach is needed. On the industrial side we need to combine competitive growth with sustainable development. This again integrates many areas. However, it is very important to define the key technologies, the bottom-up approach, consulting our advisory bodies and Member States, and then to have, co-ordinated efforts which are responsive to the challenges I referred to. This in a nutshell is the orientation of FP V and, this is a very welcome opportunity for us to be present here to have an interchange of ideas and also benefit from your wide experience in the field of science and technology research.

324. Thank you, Professor Routti, for that very helpful introduction. I wonder, to start the questions, whether I could ask one rather fundamental question. You referred to the need to co-ordinate research and I think we would all accept inevitably that modern science must co-ordinate globally across continents between centres of research. There is no doubt about that. Could you explain to us what you think is the essentially European Union element of that co-ordination? What is it that must be co-ordinated within the European Union rather than with other groups? You mentioned, for example, the human genome programme. As I understand it, that is work which is done across many continents?

(*Professor Routti*) The European Union, of course, has some possibility of co-ordinating the Member States activities. It has advisory bodies consisting of scientists, industrialists and science administrators from all countries. One could, of course, also see that this could be done at the professional society level but I think it is very important to have also funds to help this co-ordination. I mentioned that our share of the total investments is fairly small but it is very influential when we evaluate its impact on co-ordination. We of course want to seek leverage in co-operation with member countries. We want to seek leverage also from the structural funds up to a point. It is also true that many questions are related to policy-making and the policy formulation in the European Union happens also at the Community level. So, for instance, climatic change, food policies, competition policies, need to be uniform and the research needs to support this. There always has to be free academic research, which is the best way to explore the unknowns, but when we talk about industrial competitiveness, linkage to Community policies, building infrastructures for knowledge-based systems, I think it is useful to have a European-wide approach because the local markets, even in the biggest countries, are often too small to justify the investments which are needed already in the research phase, let alone after.

325. Of course, there are other European programmes such as EUREKA which are also effective in achieving co-ordination. Do you think there is something which can be specifically achieved by the Framework Programmes which would not be achieved by these other co-ordinations?

(*Professor Routti*) EUREKA is a framework for industrial co-operation for projects which are fairly close to the marketplace. There the common activity is very much the co-ordination alone without significant contributions of financial support. We are closer to the earlier phase of the innovation systems. We also support projects where it is not yet possible to attract private investment. However, these technologies are very important as a strategic element to industries. In these areas we are seeking advice and co-operation with the industries not only in funding but also in formulating the strategic objectives.

Lord Haskel

326. I was very interested in the list of proposed topics for the fifth Framework and I was wondering to what extent this list of topics reflects the interests of the responsible Commissioners rather than the actual needs of the scientific community and industry?

(*Professor Routti*) My Lord Chairman, the priorities within these themes need to be defined by using the best expertise in all Europe. We have, of course, our scientific and industrial advisory bodies, our decision-making bodies at the CREST level; there is competence at the European Parliament, where there is a committee on energy research and technology, and then we have, of course, programme committees in specific areas.

I think that this question relates partly to the choice of the task force topics, which have been to a certain extent criticised by the scientific world. When the Commission made a proposal for selecting certain task force areas, this was related to supplementary funding which the Commission was requested to make a proposal for. In the scientific world we should be quite content with the fact that the European Commission has chosen science as the best vehicle to address some of the very complex issues facing our societies in the area of transportation, health care and education. I do not think there ever was a chance for the science Commissioner to have a possibility of defining these priorities purely from a scientific interest alone, but rather to get the support of the Commission as a whole it was necessary to define topics which relate to difficult and challenging questions on many fronts. But one should not draw the conclusion that the supplementary funding proposed to supplement the fourth Framework Programme is our picture of the structure of the fifth Framework Programme. The task forces have a more developed role, more as a management and co-ordinating tool. Much of the programmes will still be based on the same procedures which have proven successful in the previous programmes.

327. So the Commissioners define the areas and science and industry define the topics within those areas?

(*Professor Routti*) That will not be the case in the future. The reason why it was done by the Commission was that the time available for making those proposals regarding task forces was very limited. There was not a chance to invite proposals for this new concept and its priorities and to analyse these in detail. The task forces were launched as a pilot phase and we actually now see that the funds will not be available in the quantities originally

Lord Haskel *contd.*]

planned for. The Research Council will be discussing the allocation of 100 million ecus at its meeting in December 1996 and this will allow the launching of a small number of task forces. The concept, however, has been quite well received because the co-ordination is quite important. For instance, the Irish Presidency of Council has proposed research on an important topic related to drugs. One can study the physical, chemical and biological detection of drugs; one can study satellite monitoring of cargoes; one can study the socioeconomic impact of the illicit multi-billion ecu trade; one can study the biological impact of drugs on the brain, the question of addiction and de-addiction, and one can study the experiences of different policies towards drug issues in different countries. All these studies need to be integrated to be really helpful to the policy-makers.

I come from Finland and I might mention one successful task force which we executed about 15 years ago, namely the Nordic Mobile Telephone system. Before that time there were about ten different companies in Nordic countries competing with different concepts of mobile telephones, one serving defence, another one serving fire brigades, one serving police forces and so on. It was very useful to define, together with research, industry and government, the common standard called NMT Standard, which became the standard in Nordic countries and some other countries, allowing companies like Ericsson and Nokia to have access to rapidly growing markets and allowing them to invest heavily in digital technology. These two companies, along with Motorola, are now the leading companies in the world. Nokia is the biggest producer of cellular telephones, Ericsson the biggest producer of systems, and this has created from scratch an industry which never had a chance of flying without this type of co-ordinated effort because the markets would not have been created.

Baroness Platt of Writtle

328. Following up the question before that, you emphasise the importance of the social impact of the research that is being done and in this press release it says: "Broad consultation at each stage of the process with a view to making research serve the man in the street." I would include the woman, as you would imagine! That I can understand because you are, in fact, identifying the markets, as you have been talking about with the mobile telephones, but then on page 8 of the longer document, the communication from the Commission, *Inventing Tomorrow*, you say: "The concept of public and social acceptability which ensure that research is meaningful to European citizens." I have served on the Royal Society Committee on the Public Understanding of Science but I have to say that the media and the public find it very difficult to understand and I do not quite see how you are going to make it meaningful to them?

(*Professor Routti*) I think there are two elements here. One is the visibility of European science. I think it is important to have visibility, to have the support of our taxpayers who, after all, are paying the bill, and the decision-makers have to make priorities, choose between priorities. The other thing is the socioeconomic aspect of science. There again there are two or three different elements. The central question of concern to citizens, the interaction of science with employment and industrial structures, is one of the key questions of European societies today and we need to understand better the linkages between research, science, technology, unemployment, competitiveness, growth. Of course, there is a short-term impact typically of reducing employment because of rationalisation and introducing technology. On the other hand, most studies indicate that with our cost structures the only way to be successful in today's world when there are cheap labour countries in many parts of the world is to have higher value-added products and to build up high value-added industries based on science. The second question is, what is the impact of key technologies. Today when we are seeking further funding in information technologies, in fusion research, the European Parliament and the citizens want to know what is the socioeconomic impact of these technologies. We of course know it is a difficult question. Even major corporations which are experts in the field have failed to forecast the technology and its impact accurately but it is something that we need to do with our best knowledge. So we need to have socioeconomic studies of our own in the areas of our own competence to be helpful to European policies and then we need to integrate the socioeconomic impact analysis in many science and technology programmes. We know, for instance, that in the area of genetic engineering there is a very heated debate taking place today on whether genetically modified crops can be put on the market, whether genetically labelled compounds can be used for diagnostic therapy and so on. These are questions where the future remains difficult to predict, as it was and has been difficult to see the development of nuclear power. I still believe it is a very useful option for the future and for today, but, of course, the political reality today is very limited. It is very difficult to see how genetically modified crops will be accepted. Of course, we have been trying to modify crops for decades, hundreds of years, by cross-fertilisation, but the accuracy of genetic engineering allows a much faster pace.

329. That is not understood by the public.

(*Professor Routti*) It is not well understood but there are two scenarios. One is that because of the scares this will not proceed and go on, or the other possibility is that people will actually appreciate the health benefits which can come along with this. There is a company again in Finland which has produced a butter which will actually reduce cholesterol. It has proven to be very safe and, of course, it is more valuable in the marketplace than the original one. It is hard to say whether 20 years from now everyone will want to have as healthy foods as we can make or whether these developments are banned. These are challenges not only to science but also to policy-makers.

330. [*Question omitted*]

331. The other thing you have just brought up is this contradictory matter of the application of

Baroness Platt of Writtle *contd.*]

technology in competition to the Pacific Rim countries, where labour is much cheaper. When you apply technology you nearly always, in the first instance, reduce employment and yet you have these two contradictory aims of global competitiveness and reducing unemployment. Clearly, if your high-technology firm is successful, as you say, then there is over the years a rollover in terms of employment but it does not usually follow immediately, does it, and that must be a contradictory thing to be able to follow at the same time?

(*Professor Routti*) This is, my Lord Chairman, the very challenge. I just came back from China where we had a European Union/China technology symposium attended by about 200 Chinese and half a dozen Europeans. China is an economy which is growing at a very fast rate, about 10 per cent a year. There were interesting economic analyses made about catching-up time, which was estimated to be around 40 or 50 years, unless there are political disturbances. This means that in many areas we have to look today at the world as a whole. The planning horizon for Framework Programme IV was very much the single market, competition policy, a European framework. Today it must be a global perspective, and then there is a great need for European countries to work together to be successful in the global markets. In many areas the investments in South-East Asia will be the largest part of investments in the world. If you look at the telecommunication industry, it has taken us 120 to 150 years to build up a telephone system, to bring in copper wires into every room, to have telephone poles all around the countryside. It has cost us maybe a few GNPs to do it. It can today be done in a fraction of the time and at a fraction of the cost by using satellite technologies, optical cables and cellular systems. The value of the technology transfer is not billions but trillions to countries like China and South-East Asia. There is no way we can or should stop it. We have to be there if we want to be anywhere. This is a new challenge and it calls for European-wide collaboration, because unless we are successful in launching common platforms and making those competitive in the world, we will not be able to compete in these markets.

Lord Craig of Radley

332. My Lord Chairman, I think we have drifted slightly from the question I had in mind, which related more to Professor Routti's earlier comments, particularly about co-ordination and making sure that the right subjects were being addressed. One of the things which flows is how best to improve transparency of the selection process, who is involved in that process, who has been consulted, whether there is any need for independent scrutiny. It seems to me, in fact, on that last point, bearing in mind that one is spreading right from, on the one hand, the scientific research imperatives to, on the other, the social and environmental issues, that there is a very wide spread there. Is there such a thing as an independent scrutiny achievable when we are looking across such a broad spectrum? I would be interested to know whether you feel that there is enough transparency or whether there is more that needs to be done so that those who are paying for it, i.e. the public, feel confident that they are getting good value for money?

(*Professor Routti*) My Lord Chairman, let me first of all clarify that the science and technology programmes do have these challenges of providing an interaction with industrial competitiveness, society needs, the policy side and so on. It is not our intention that those will all be integrated in the programmes but we create these interfaces.

The core activity, on our side, will be the management of the research programmes. It is quite a challenge because of the heavy over-subscription of the programmes of an average factor of six to seven and in some areas even higher. This year we organised a seminar in June to streamline the procedures so that they will be shorter and more transparent. We have published all the selection criteria so that the scientists can see what are the weighting points. They will also get a response to their projects, whether they are successful or unsuccessful. Transparency, of course, is very much sought after. The experts are chosen amongst the candidates proposed by the member countries. The Commission has to make the final decision on the projects. So we have divided this into the evaluation phase and then the actual decision-making phase. The programme committees consist of the best experts appointed by member countries who will have their word to say in the final decision also. It is a rather complex procedure but I think progress has been made, and when we compare this to many Member State situations I think the Commission can be considered to be fairly competitive considering the wide fronts we must address.

333. Do you see a role then for any form of independent scrutiny over and above all this fairly complex scrutiny you have outlined?

(*Professor Routti*) As I said, the evaluation is done by experts chosen from member countries. There is also, of course, an important function of evaluating the current programmes and their results. Every programme will be evaluated. We have the overall evaluation conducted by a high-level panel chaired by Viscount Davignon, who was Commissioner before, and their report is expected in mid January. This evaluation will play an important role in defining the priorities and procedures of Framework Programme V.

Lord Phillips of Ellesmere

334. If I can take you back to your opening statement and two aspects of the very interesting document, *Inventing Tomorrow*, which we have all read, you were critical of Framework Programme IV, in that it was, in your view, too fragmented, supporting too many things, not very responsive to new emergencies and, therefore, what we need is something more flexible in Framework Programme V. You went on to say, as the paper does, that Framework V will focus on three main topics: life sciences; IT, with all the important developments there; and industry, competitive growth, sustainable development and so on, supported by bottom-up

Lord Phillips of Ellesmere *contd.*]

suggestions of things coming from the science, technology and engineering communities which clearly will need attention. When you add all of these things together it begins to seem a little bit like *plus ça change, plus c'est la même chose*. How are you really going to make Framework V in the event significantly different from Framework IV in terms of focus?

(*Professor Routti*) My Lord Chairman, of course we need to, and want to, maintain the best elements of Framework IV. We consider it quite a successful programme and it is considered a successful programme by other Member countries. Will it be different? The flexibility issue, first of all, can be addressed in many ways. One can have, as we are proposing, a smaller number of larger themes inside which the specific areas of interest will be defined for the early part of the programme at the beginning, but then there is an opportunity to have an annual check of the priorities and to adjust those which the experts will advise us on. One could also have a margin to be devoted for needs not foreseen in the beginning, but our preference is to have the wider themes defined. In these wider themes there will be a large number of key technologies and scientific areas which are considered most important for industrial strategies, for scientific discoveries. We will be making these choices in collaboration with our experts in our advisory bodies and with all the Member State expertise. There is great interest in maintaining a large number of participants in these programmes. We recognise the fact that the European scientific and industrial world is very widespread. There is good competence in all quarters of the university and research world and there is an interest and a need for participation in these programmes. We want to have more co-ordinated efforts so that the different contributions can add up in a more efficient way to avoid duplication to cover fields and areas which might be left uncovered if there was not this co-ordination. The management issues are rather challenging in this regard. The task force concept we see as a management tool which can identify research needs in order to address certain objectives, such as better transportation or energy systems. The same key technologies can serve many objectives. Let us take telematics; it is something which is very useful for traffic control, for medical applications, especially of aging populations, in educational systems, and in environmental monitoring. We cannot afford to develop four or five different telematic technologies to serve these different needs, but we want to use the possibility offered in many fields.

335. Could I press you a little on the management problems. When you talk about more flexibility, for example, you use the examples of BSE and the development of the World Wide Web. The situation with the World Wide Web has been transformed by the introduction of a new programming language, Java, and the development of new browsing programmes by new companies, Netscape, for example. We understand, and I know from experience, I have to say, that quite often arriving at a contract between the Commission and the people who are going to undertake work can take as long as a year. In the development of a system like a World Wide Web explorer programme a year is infinity almost. How are you going to get over that?

(*Professor Routti*) That is very true, the timescales in these software industries are very fast. The World Wide Web was originally developed at CERN. It was first developed for the needs of the scientific community but then it very quickly expanded to a worldwide information network. This is very fast development indeed. One could say that it took 50 years for the first generation of industrialists to build their empires in steel, construction, manufacturing: it took Microsoft ten years and it seems to take one year in the Netscape area. So it is very important to be responsive to these needs.

I would think that if we had a more integrated approach there would be also more technology forecasting, there would be an evaluation of new opportunities and we could be more flexible in larger research projects to take on board these new opportunities. There is also need to try to shorten the time between the proposal and the final decision. It is very difficult to get it done in less than three or four months. That is about the minimum if we have to respect, as we want to, all the rules related to impartiality and transparency when going through every application and screening the results. It is very difficult to see what will be the challenges and opportunities several years ahead, and we can see that even some of the major corporations in this field in the world have almost failed by not being responsive enough to these very rapid developments.

Lord Nathan

336. Professor, you have used the word evaluation a number of times, which is very important, and you gave a most interesting example in the case of Nokia and the northern mobile telephone system. The knowledge of the evaluation of programmes, both at the scientific level and the application of the scientific outcome, is crucially important to support public opinion in relation to the expenditure of these very large sums. We did pursue this with certain other witnesses less well informed than yourself, who indicated that the Fourth Programme, for instance, was too recent to have produced anything which could be evaluated sufficiently. Can you help us on that?

(*Professor Routti*) The Fourth Programme has now been in execution for two years. We launched well over 2,000 new projects in 1995 under the Fourth Framework Programme. The current evaluation takes a somewhat longer horizon, about five years. So it can take into account the results from the current Framework Programme as they are available. I personally think that the evaluation of the results is very important, not only because it is public funding but also because it can provide us with guidance for the future. On the other hand, the world is changing very fast and to do it on the basis of experience alone would be a little bit like looking at the rear view mirror in trying to look at the world ahead. I think the evaluation also needs to be combined with Technology Foresight activities and there it is very useful to benefit from the excellent

Lord Nathan *contd.*]

work in Member countries. In the United Kingdom there is excellent work in this field which can be combined with the evaluations.

Lord Soulsby of Swaffham Prior

337. Professor Routti, on a number of occasions you have mentioned the role of task forces and I wonder if I might return to that. They were originally conceived to be proactive and have their own budget, but now the budgetary side is not going to be forthcoming. What role do you see them playing in the Fifth Framework Programme?

(*Professor Routti*) My Lord Chairman, whether the word task forces will be used as a name is yet to be decided. The task forces will not be an allocation mechanism but a co-ordinating mechanism. I think the concept has been quite well accepted. The challenge today is that if we do have 20 programmes and if there is a certain amount of supplementary funds now allocated, we need to decide in advance how these additional funds are divided between different programmes. This is not a very reasonable thing to ask because if we talk about, let us say, the future car, one can put emphasis on environmental effects, its safety records, its compatability with our cities, the choices of material for life cycle analysis. These priorities define the research objectives. The task force is a management tool where the first step is to analyse what the research needs are and to focus research in these areas and then, once the results are available, to make sure that these will be coupled to the industrial development in these areas. So the task force is much more a co-ordinating tool which will draw upon the expertise of European science, industry and expertise on the public side as well.

338. Whatever you might call them, will the members of the task force or co-ordinating force be independent of those people undertaking the research or will you rely on the actual research workers to input into the task force?

(*Professor Routti*) They will be independent in the sense that we could not collect a group of people who would then divide the funds amongst themselves. They have to define the research priorities and then it is open to public calls for proposals, and the evaluation procedures will be done exactly the same way as for other projects. It is more the method of defining the research needs for certain society-driven or industry-driven areas.

339. I rather understood from other witnesses that the task forces would also have the duty of overseeing the progress of the work in a given area. Is that what they would still do or would they merely operate at the beginning to define what needs to be done?

(*Professor Routti*) They have two roles. They have to look at the starting point, what are the research needs, and there is also a challenge of coupling this then to further developments. Maybe, my Lord Chairman, I could invite Mr Escritt to contribute at this point because he is in charge of the Directorate on Framework Planning at the European Commission and task forces have been the new element which has been very much analysed by that Directorate.

(*Mr Escritt*) I think task forces have been clarified, not least in the Commission's concept, as the discussions have progressed on the so-called supplementary funding proposal under the Fourth Framework Programme. Incidently, it is our hope that funding will be provided as a result of the Council and Parliament's discussions for the areas within which the task forces are operating. The point that we must stress is that task forces are not the spending instrument as such. That remains very strictly, and according to all the legal framework of the Framework Programme, the responsibility of the specific programmes. That is why we have been at pains to stress that the task forces are there for consultation and co-ordination. The consultation is between the Commission staff and all the interested partners. So they are open to independent experts, whether from universities or from industry. As a result of that consultation process there can be improved co-ordination of the research activities first and foremost within the Framework Programme. What we have learnt from experience is that that process seems to be helpful not only within the context of the Framework Programme but from the point of view of the task force partners. In certain cases the industries have already had collaborative frameworks, the aeronautics industry, for example, but it seems that even those industries have found that the focus, the interface, has helped them concentrate their minds and better identify the sort of projects that they might wish in the future to undertake together. In other areas industry has, as a result of the Commission's initiative, established what they have called industrial mirror groups to act as a counterpart to the Commission's task force. So I think the general message is that these have been very flexible instruments. They are not the Commission dictating. The Commission has taken the initiative in creating its own task forces of its own staff, but those have, it seems in practice, not only increasingly convinced people of the merits of this approach but been seen quite genuinely by those who have been involved as a rather useful point of contact and a rather useful catalyst.

Lord Phillips of Ellesmere

340. Professor Routti, you have at least twice spoken in a complimentary way about Technology Foresight. I have two problems about Technology Foresight. First of all, I think it is a process that in principle is rather unlikely to foresee the really dramatic new developments on the horizon. For example, I do not think anybody's Technology Foresight programme foresaw the introduction of the Java programming language by Sun Microsystems which is transforming part of that world. So to rely on a Technology Foresight programme to see where the world is going is not entirely reliable and you do need this bottom-up process, and even there I do not know that Sun Microsystems would have come along to you had you been an American organisation and said, "We have had a very bright new idea which we think everybody should take up." They would have a different view of it. My second problem with

Lord Phillips of Ellesmere *contd.*]

Foresight is that it also has another role, as seen in the United Kingdom, and that is to improve the networking between academic and industrial scientists, or between academic workers and industry generally. My worry is that although the networking between academic scientists and industrial scientists, in my experience and, I think, in most people's experience, is generally quite good, there is a gap which the Foresight process has not really addressed and the gap lies between scientists and a group of people that I might call the captains of industry. In some sectors of industry, the pharmaceutical industry, for example, that gap does not really exist, but in many industries, and perhaps this is more true in the UK than elsewhere, there is certainly a gap. The industrial scientist finds it just as hard to persuade the finance director and the chief executive of his company as the academic scientist would. So how do you see that problem being addressed in these Framework Programmes? Are you carrying the captains of industry with you?

(*Professor Routti*) Technology Foresight is a very difficult area. I share your concern that the accuracy of predictions is not sufficient to be the real or the only guiding instrument for allocating funds in the Framework Programme. On that side we are building networks. There is a European technology assessment network consisting of about 300 people. I do not think it works very well yet, but we have just changed the management and we hope that that will be a network where there will be an interaction between scientists and industrialists. My experience about Technology programmes from a smaller country was that the first generation of Technology programmes were science driven. One was looking at the opportunities provided by very large-scale integration in micro electronics, optical cables and switching the possibilities there. This was not very useful because it did not really provide a competence which would be sufficient to compete with the industrial giants of the world which are really forming these new technologies. The second generation of Technology programmes (I think the Foresight relates to technology more than science) was interaction between what you call industry research captains and then the academic world and that has been much more useful. That is to say, you combine the intelligence from the scientific world, what are the scientific and technological opportunities, with the considerations by the user's side, what are the relevant and strategic elements in our area and then you can define the priorities in a more reliable way. There always remains an element of surprise and this is something which makes science that much more interesting. It is also a world where there is a lot of opportunity for new players and this relates to the one aspect which I referred to earlier, that is how to best build up a system which can be responsive to these new opportunities.

341. I think you touch there on the new emphasis on work related to social needs. Here there may be a case for scientists being more aware of the opportunities that they and others perceive to be available for improving the state of society in various ways and to direct their work more in that direction. How do you see the emphasis on what I still insist on calling social science in the new Framework Programmes?

(*Professor Routti*) Socioeconomic research plays a relatively small role in terms of budget numbers in the current Framework Programme; it is about 140 million ecus out of a total of 13.2 billion ecus. Its importance is growing, but I do not think we need to duplicate the effort done at a national level. In the United Kingdom the social sciences body has an annual budget of some £100 million and it is involving a very large number of individual projects. I do not think we need to have exactly the same approach on the European side. We need to have more co-ordinated studies which make research results useful for policies. We also need socioeconomic impact analysis related to major technologies and put together the social scientist with technology and science researchers. In many task force areas, for instance the transportation issues, many questions relate to behavioural science rather than technology—we do not need a new car; we need a new driver. We have to have a systems approach and the individual's behaviour is a very important element in the success or failure of these systems.

Lord Gregson

342. A number of our witnesses have expressed concern to us about the insufficiency of staff in the Commission to direct and manage a programme the size of the Framework Programmes and how this stretches our time limits or makes it very difficult to react in the speed at which technology is developing. Would you like to comment on this problem, particularly in relation to the turnover of staff and the continuity of programme support?

(*Professor Routti*) The management costs associated with research budget allocations are quite precisely defined and typically the overall percentage has been declining with increasing research funding and that is fair because there are certain economies of scale on that side too. I think the objectives of transparency and unifying the procedures will also cut down the management effort. We have an adequate staff to handle these questions. There is a need and place for improvement in shortening the times, co-ordinating better the different calls for proposals so that the common resources on the contract side and auditing side are best utilized. We depend very much on external help in the evaluation processes. On the Commission side, I would say that the turnover of staff is not a major problem. We do get very competent people. Of course we want to maintain a certain degree of staff renewal because it is important that you keep up with the latest developments of science technology. Maybe the more difficult thing on the staff side is the contractual expertise, lawyers, auditors and so on, which is more and more demanding. We are not yet using very sophisticated financial instruments in the European Commission. I have previously worked a lot with an agency in Finland which worked through loans, equity investments and so on and then the issues get to be much more complex.

Baroness Platt of Writtle

343. We have had a complaint that sometimes the signing of the contracts and the start date were very close together and that created difficulties in finding staff, researchers and so on, in time to start at the contract date. That is one question. Another question was the complaint of excessive turnover of staff so that whereas you sorted something out with one member of staff, by the time it actually came to the contract it was somebody different. One obviously has, as you say, to combine continuity with up-to-date researchers, but I wonder how these work out.

(*Professor Routti*) The total response times are very important and difficult questions especially for small or medium-sized companies and for research teams which have difficulty staying together to maintain the competence. So in this field sometimes we say that there is nothing worse than "slow—no". In some areas we are using a lighter approach. For instance, SMEs are allowed to send in a very light proposal and then that would be evaluated and they will be encouraged or discouraged to send in a more detailed plan.

344. I should think that would be very helpful.

(*Professor Routti*) Also, in the areas of the Fellowship schemes, young people are typically looking for Fellowships, but, of course, they must be looking also for something else. So there again it would be very important to get an early answer and not to get the answer just one or two weeks before the programme starts. However, the requirements of impartiality and transparency call for rather strict procedures, so there is a balance which we have to strike here. The two-tier approach is very useful in some fields but not in all. In life sciences we receive 15 times as many proposals as we can fund, and these are proposals already well prepared. If we were then to have a lighter approach then there is the risk that we get even more proposals which are even more difficult to judge because they will be very short and concise. In some fields, it is useful just to make a proposal even if you do not get funding. I have worked in universities for 20 years and it is very useful to be asked to specify your objectives, your goals, your budgets, but it is disappointing if the outcome is not positive on the financial side.

Lord Butterworth

345. A number of our witnesses have really said the same thing to us in different ways, i.e. they have said there ought to be more delegation of responsibility within the European Commission. What do you think of this? Do you think this is a fair comment and, if so, what ought to be done about it?

(*Professor Routti*) My Lord Chairman, the delegation and, the procedural questions are being examined now on a number of fronts. I referred to the internal exercise which we did, looking at ways of improving things on the research side. There is in the European Commission a larger effort called "Sound and Efficient Management 2000" looking at the procedures on a wider front. I think this will be useful for our purposes because most of the procedures at the European Union are not designed for research funding allocation, they are designed for making Directives which have the effect of law. They are subjected to inter-service consultation so that everybody can see what is the impact on their side and I would hope that some of the procedures could be shortened. There is the Inter-Governmental Conference in progress. That has not been set up because of the interests and needs of the science research management. It has been set up because there are ten new Member countries waiting for membership and the current procedures calling for unanimous decisions on the Council side and approval by the Parliament would simply not work with such large numbers of members. At that time we would also hope that qualified majority decisions could be introduced into the science management area and that could also help to come up with decisions on the major policy questions at a faster pace. We are now expecting a decision on the task force, and supplementary funding. It has taken us 1½ years and we end up having 100 million ecus which is less than 1 per cent of the Framework Programme. So this is a disproportionate amount of effort put in this area, although of course it has been very useful because the new concepts have been widely discussed.

346. Where in particular would a qualified majority be observed?

(*Professor Routti*) In the Research Council a unanimous decision must be reached about what is the allocation between topics.

347. When you get down to individual projects do you require unanimity then?

(*Professor Routti*) No. That is done at the Programme Committee level. The Programme Committee as a whole has a veto right on the Commission proposal based on evaluation. It is quite seldom that voting is done there. It is more difficult at the Council of Ministers level. It is very difficult to come up with a programme where everybody agrees with everything. I think it would be fair to have programmes where most participants agreed with most topics. That is the way also in the political world: a solution must be found.

Chairman

348. Professor Routti, the Commission's paper "Inventing Tomorrow" discusses the need for simplified decision-making procedures and suggests that matters could be simplified by reducing considerably the number of programmes and the number of committees. Would you like to elaborate on those suggestions?

(*Professor Routti*) My Lord Chairman, today we have a large number of programmes. They have their own programme committees. In order to respond to some areas which do not fall exactly in the area of any programme, we need to define a joint goal and have the fairly heavy process of having two committees to meet and agree on schedules, priorities and so on. If we have a larger area—let us say, in information technologies—then of course questions related to telecommunications, telematics, information technologies, can be looked upon and evaluated, having the expertise and comprehension of this whole area. So our feeling is that the wider areas which are less compartmentalised will not only bring

Chairman *contd.*]

flexibility, but they will also bring a more balanced discussion of the key areas defined for targeted action. We do not imagine it will be very easy. There will be a lot of competition about the key technologies, but I think it is useful to look at these key technologies and scientific areas from a wider perspective than from an angle of a narrow expertise. My experience, having run a much smaller organisation before, was that it was very useful to have economists, biologists and information technologists to work together, because then we would have competition also between different disciplines, and you could bring in the expertise and knowledge of different fields. We know that in the world of science very often the most significant discoveries do emerge from crossfertilisation of ideas between different disciplines. So a very compartmentalised approach with specialists in that field alone, in our experience, is a very rigid system.

Lord Porter of Luddenham

349. Professor Routti, in looking at the content of the Framework Programme the principal difficulty I find in assessing whether it should be there or not—and I think the Commission may have this problem too—is what is European, what is global and what is national, as far as research is concerned. It may be good research. It may be better done nationally or globally. For instance, why should the yeast genome be European and the human genome be global? I did not follow that. May I ask one specific example which is to do with the Joint Research Centre, which we have not yet talked about this morning. To me, the Joint Research Centre is not obviously needed as a European activity. We have research centres nationally, we have research centres globally. However, you did justify the purpose of the Joint Research Centre in one specific way which was European. This is from your paper "Inventing Tomorrow". You said that they "are a source of independent and impartial expertise to meet the needs of Community policies". If they are independent, impartial, I would have thought that the last thing they should be is associated directly with the people they are advising. In any case, do not there exist already sources of advice equally good, or perhaps even better, in other research organisations which are in competition with each other and will give you all aspects of that advice?

(*Professor Routti*) My Lord Chairman, the Joint Research Centre was part of DG XII until early this year. It has now been separated because it is at the same time getting Commission funding; it is in competition with some of the member country institutions or industrial institutions. The history of the European Communities started in the Steel and Euratom exercise, and the Joint Research Centre was first established in those days. That mission has been completed, although there is still an important task to provide the safety criteria for nuclear power, for instance, on a European level. In today's world also I think there is a need to have a European reference laboratory and many questions related, let us say, to food safety, environmental questions, let alone the more controversial issues of safety of weapons tests somewhere in the Pacific, would make it difficult for a national laboratory to address these questions. There is also a benefit of having an infrastructure where European scientists can work in a totally international environment on science projects. The Joint Research Centre has also formed close links with Eastern Europe. It is managing some of the programmes which are devoted to the conversion of defence industries into civilian use. It has created links with emerging economies.

I think that the JRC is in a rather challenging transition period. It is an organisation whose staff policies are complex. There are Commission staff, Euratom staff, Member State staff and contract staff, and it is not very easy to transform this in a rapid way. My feeling in the long run would be that in addition to maybe a smaller JRC we would be looking for a network of collaborating European laboratories which would be, in a sense, a distributed Joint Research Centre, but this of course will be resolved over many years of development. Let us say a particular country is interested in a facility in laser tooling. Investments are typically in the millions of ecus. This is maybe too much for one small university or even small country to invest all alone. We could provide European-wide support for these facilities on the programme side, to make them accessible to European scientists to find better utilisation of extensive and expensive equipment. The transition towards such models—which are shared by JRC—does also take some time; it is not something which one can do in the short term. Of course many member countries are facing exactly the same types of problems with their own single laboratories where the mission has changed and it has not been very easy to transform the single-mission laboratory into new areas.

350. You referred to the historical development of these programmes. I notice that of the seven institutes in the Centre four are wholly or partly dealing with nuclear power—that is, four out of the seven. It may be that one of them is about the safety of the fusion reactor and so forth. Is this historical? Do you see the development staying, or do you see any big change here? Will it remain about four-sevenths—over half—nuclear?

(*Professor Routti*) As I mentioned, the history is the reason for this original concentration in these areas. One has very much the same situation in many European countries such as France, the United Kingdom. In Finland we never established such a special nuclear laboratory, but a multi-disciplinary laboratory with one unit looking at these questions. The JRC is rapidly diversifying its efforts and has of course done it over many years. Quite recently a science park has been established in ISPRA to provide a better interaction with the industrial world. There was an independent evaluation of the nuclear-related matters by experts appointed by member countries. Their recommendation is that about the current level of Euratom activities needs to be maintained in the Framework Programme. Of course the JRC has an important contribution in this area, although it is not the only beneficiary of these programmes.

Lord Porter of Luddenham *contd.*]

351. You are saying that four-sevenths is considered the right proportion of nuclear research?

(*Professor Routti*) No, I was not referring to that; I was referring to the Euratom Programme budget out of the total Framework Programme budget. Certainly there will not be four out of seven. Every one of these laboratories is diversifying effort and trying really to define what is the complementary action. In some cases also we see developments which certain Member States take. For example, the high-flux reactor and Petten reactor is now supported, in addition to the European Union, also by the Netherlands and Germany which are the greatest beneficiaries of having such a facility.

352. That sounds as though they are national-driven really, the way you put that. Nuclear apart, assuming this is coming down, what do you then see as the main areas which are appropriate for European joint research institutes?

(*Professor Routti*) I would say that if we want to co-ordinate large research programmes we also need to have competent management teams to do this co-ordination, and the Joint Research Centre of course has competence in this area. It is not very easy to define what are the specific scientific and technological areas which the Joint Research Centre should be devoting its activities to in the future. I am no more responsible directly for the JRC planning, and of course Professor Contzen could be invited and would be willing, I am sure, to respond to these questions. It must be based on the expertise which is there today and the Member States' opinion of what are the critical areas where they can make the best contribution, and of course the governing board of the JRC consists of the representatives of the Member States.

Chairman

353. Mr Escritt, did you want to come in?

(*Mr Escritt*) Yes, my Lord Chairman, on a purely factual point. The figure to which Professor Routti referred—that is to say, the figure which the independent experts have advised the Joint Research Centre they should retain for their current level of nuclear activity—represents, I understand, roughly 30 per cent of the total Joint Research Centre activity, rather than the four-sevenths which might appear from the simple counting of the number of institutes.

Chairman] Thank you, that is helpful.

Baroness Platt of Writtle

354. I was interested to read in your report that you measured the amount of R & D in terms of inhabitants, active persons and so on and compared the European Union, USA and Japan. Surely the most important thing really is to what extent that is exploited successfully in the market? Do you measure that?

(*Professor Routti*) The numbers given there refer to R & D investments by member countries as a function of their GNP. The average number for Europe is about 2 per cent. There is a fairly wide range, ranging from less than 1 per cent to almost 3 per cent in some of the industrially advanced countries. Japan has just now proposed that public investments in basic research will be increased by as much as one-half of what they are now. Of course the starting point in Japan is different. In Japan the industrial corporations have had an 80 per cent share of the total R & D investments. That share has reduced somewhat because of difficulties of exports, the strong yen and so on, and to compensate for this small decrease on the industrial side, on the public sector it is proposed to invest more. The R & D investment is not a measure of success directly, and every company president knows that his shareholders would often prefer the dividends than investments in R & D. However, it is wise and it is necessary policy in many areas to make these investments. It is not very easy to compare directly different countries about their R & D investments and their efficiency. It very much relates to the industrial structure of the country. We have seen in my country an increase in R & D from less than 1 per cent to the top level in Europe now, 2.9 per cent, because of the change in infrastructure. Was it the reason or was it the consequence? It is difficult to define, but of course it is clear that if you do have industries in telecommunications, pharmaceutical industry, your average investments in R & D will be 15 to up to 20 per cent of your revenue, while if you are running a pulp mill you could never afford to invest 20 per cent of your revenue in research, although a pulp mill must be very high-tech today to be competitive. So these are macro-economic indicators which of course give a direction and give a reflection, but I would say that the economists today very much recommend that there should be an increased investment in order to create industries and economies which are based on knowledge much more than other ingredients to production—that is, labour, raw materials, energy, capital—because the other elements are rather expensive, all of them, in Europe. We have high interest rates. We do not have a lot of natural resources. Our labour costs are high, and our energy also has to be bought from world markets.

355. Do you measure the exploitation of your R & D? It is how it succeeds in the market which is surely the vital thing?

(*Professor Routti*) These are of course challenges—that is, how to measure this. We are working on these macro-economic indicators. We know that the policy-makers need to know about indicators other than the number of publications, citations and so on. We have done it in a small country, Finland. Our result was revealing. We analysed 1,000 projects in science technology. The total investment was 250 million ecus. 60 per cent of these projects were successful, 40 per cent unsuccessful. The economic result was 8 billion ecus more additional activity, with out of that about 5 billion exports and 5,000 jobs. If you divide 250 million ecus by 5,000 you get 50,000 ecus per new job which is a high value-added job, which is a very good investment in countries where unemployment costs are about the same order of magnitude over two years. Macro-economic indicators like this have convinced the politicians in our country to increase R & D investments.

Baroness Platt of Writtle *contd.*]

356. Yes, in Finland, but it does not happen Europe-wide.

(*Professor Routti*) We are trying to develop these indicators also on the European level. It is not easy because the research structures and the industrial structures are rather different, but it is a very good challenge. Another indicator might be the share of high technology out of your total exports. Perhaps I could quote some numbers. In a large country like the United States and Japan it is a high number, it is about 30 per cent, according to the OECD definition. United States mostly trades in computers, pharmaceuticals, software. If you take a small country it must trade everything. The number in the United Kingdom has been going up; it is a little over 20 per cent. In Germany it has been fairly flat at 12 per cent, but is now going up. Denmark is a trading country which is investing fairly little in research, and the number there is 7 per cent. In Sweden it is about 14 per cent. In Finland it started at a level of 5 per cent eight years ago and today it is over 15 per cent. So rapid change of industrial structures is possible. Of course it requires investments, but it also needs management and I think it also needs luck.

(*Mr Escritt*) Perhaps I could briefly add to that, because I think we do have indeed a very thorough process of evaluation of the programmes, so we do try to look very much at the output, though this is, as Professor Routti has explained, in itself rather difficult to do. There is also the point to which Lord Nathan alluded earlier about how do you convey to the public the results of these evaluation activities? Perhaps I should say in parenthesis that that is why within Professor Routti's Directorate General we have put the evaluation responsibility close by the policy formulation policy and in turn close by the responsibility for communication to the outside world, so let us hope that that process of communication will improve. The difficulty is first with evaluation, how to quantify what the results are, given the wide pervasive nature of the research. What turns out is that in many cases we have to rely on what is something of a subjective estimate by the beneficiaries, industrialists in particular, and at the anecdotal level—which is often valuable from the point of view of having something which is intelligible to the public. For example, a visitor who came to see me last week from a major European informatics company said that they are working with us in the Framework Programme on projects which they could not be doing without the support of the Framework Programme, but that they were projects which had a horizon on the market of the early years of the next century, so they were extremely difficult to quantify but none the less very real for this company. Similarly at an anecdotal level, and to stay in the informatics field, one can recall the ICL company's rather clear statement at the time that they publicised the Goldrush chip—the parallel-processing chip—that this was clearly and squarely based on a project which had been within the Information Technologies Programme. If we come to the programmes more directly under DG XII control—for example, the industrial and materials technologies programme—again estimates which the participants have given us have indicated an economic benefit defined in terms of improvements of competitiveness, improvements of training, quantified very much in a businessman's perception rather than a strict economist's perception, returns which could be in the order of one to six or even more for each ecu invested—a return of at least six in terms of the benefits to them. So there is evidence, and we hope to publicise it rather more effectively as well.

Chairman: Professor Routti, Mr Escritt, I think we must bring things to a conclusion. We could go on a very long time. You have been very patient with us. You have given us an enormous amount of information, and we have also asked you for some written answers which I believe you will be giving us later this month. We will of course be publishing our report in the New Year and it will indeed be published also on the World Wide Web. We will be sending you a copy as soon as it is published. Thank you again for the great help you have given us today.

WEDNESDAY 11 DECEMBER 1996

Present:

Butterworth, L.	Phillips of Ellesmere, L.
Craig of Radley, L.	Platt of Writtle, B.
Gregson, L.	Porter of Luddenham, L.
Haskel, L.	Selborne, E. (Chairman)
Lewis of Newnham, L.	Soulsby of Swaffham Prior, L.
Nathan, L.	

Memorandum by the Committee of Vice-Chancellors and Principals (CVCP)

SUMMARY

(i) The Framework Programmes have reshaped the European Union's (EU's) research priorities as the foundation for innovation, industrial competitiveness and improved quality of life. (Paragraph 3).

(ii) FP5 must have a clearer rationale for focusing programmes and hence much firmer aims and objectives. (Paragraph 4).

(iii) UK universities are still concerned about the bureaucracy of the programmes. We give practical lessons to be learned from Framework Programme 4. (Paragraph 5).

(iv) We strongly support the introduction of a Fifth Framework Programme (Paragraph 6).

(v) The relatively low level of EU investment in research, compared to competitors, presents a strong case for some increase in funding for FP5. (Paragraph 7).

(vi) FP5 should continue to be organised in terms of science and technology objectives. (Paragraphs 8 and 11).

(vii) Under FP5 it is vital for a social science element to continue and expand and for new EU investment in the humanities to be introduced. (Paragraph 14).

(viii) It is essential for strategic basic research to feature strongly in FP5 (Paragraph 20).

(ix) We believe the UK does get value for money from the Framework Programmes and, in return, so does the EU from its investment in the UK, because of the quality of its research base. (Paragraphs 23–27).

(x) We strongly support continuation and enhancement of the TMR Programme under FP5. (Paragraph 28).

(xi) The level of overheads that universities can claim from the Commission need to be increased. (Paragraphs 30–31).

(xii) The JRC should be abandoned if its management is not substantially improved. (Paragraph 32).

(xiii) SMEs have an important role in innovation, but priority should be given to the quality of partnerships whether with large, medium or small companies. (Paragraph 33).

(xiv) The current length of the Framework Programmes is about right. (Paragraph 38).

(xv) It is essential that the UK Government provides adequate support for the research infrastructure so that the UK universities are well placed to compete for EU funds. (Paragraph 40).

INTRODUCTION

1. The Committee of Vice-Chancellors and Principals (CVCP) welcomes the opportunity to submit evidence to the House of Lords Select Committee on Science and Technology, Sub-Committee 1, enquiry into *The Framework Programmes and European Research.* We should be glad to supplement this written evidence with oral evidence, should the Sub-Committee wish it.

2. Our submission follows the questions in the Sub-Committee's *Call for Evidence* (August 1996). It was developed by an advisory group of six vice-chancellors, chaired by the Vice-Chancellor of Salford University, and was informed by detailed comments from 24 universities. A high degree of consensus has emerged on the policy line to be taken by CVCP. The CVCP also held discussions in July this year with EU Commission officials and Members of the European Parliament on the development of Framework Programme 5 (FP5).

DIRECTION

Question 1: *What lessons should be derived from the Fourth Framework Programme?*

3. The main lesson from the Fourth Framework Programme (FP4), and the preceding ones, is the crucial role that the Programmes have had in reshaping the European Unions (EU) research priorities as the foundation for innovation, industrial competitiveness and improved quality of life for all EU citizens. Europe faces increasing competition from the successful economies of the United States and the Asian Tigers of the Pacific Rim. High quality research is fundamental to industrial competitiveness, since from this comes the technologies, processes, techniques and services that make for economic success and improved quality of life.

4. Experience of FP4 suggests a need for a much clearer rationale for focusing programmes and, therefore, a much firmer set of aims and objectives. However, this should be balanced against the desirability for programme flexibility, which is particularly important in rapidly developing new fields, where the knowledge base at the beginning of a programme may be very different to that at the end.

5. The Commission has made some progress in operating the Framework Programmes more effectively and in improving internal and external communications. For example, the decision to allow applications for funding throughout the whole life of a programme was well received and should continue. But there is still much concern among UK universities at the bureaucracy of the programmes. There are several practical lessons to be learned from FP4.

(a) *Reducing over-subscription.* FP4 proved extremely popular and led to massive over-subscription. Only 1 in 6 project proposals were successful. Though this need not be entirely wasted effort, since some project proposers find other sponsors, the position needs to be improved under FP5. One means to achieve this would be to introduce a two-stage project approval process. A short outline proposal could be submitted first and, subject to its approval, a full proposal then sought. This would weed out, at an early stage, unacceptable project proposals and reduce the costs of submitting and reviewing them.

(b) *Timing.* Under FP4 the application process itself has been very prolonged. There have also been substantial delays between project submission and notification of project approval—as much as nine months in some instances. This can deter private sector industrial partners and delay research programmes. We believe that the EU should set standards for responding and that applicants should be advised on the outcome of an application within one month of the relevant management committee decision.

(c) *Transparency.* There is a need for greater transparency within the EU decision making process. In particular, the criteria for judging projects should be made explicit and applicants should receive feedback on their submissions.

(d) *Common formats.* Forms for the various programmes are nearly all different. Paperwork should be streamlined and simplified, especially through the use of common formats for information, applications and negotiations etc.

(e) *Better communications.* The Commission should make further use of electronic systems for the dissemination of information and the submission of proposals. The optical readable application forms could be replaced with forms that would be downloaded from the World Wide Web (WWW) and submitted electronically. This would save time and money. Contract negotiation forms should also be available on the WWW.

Question 2: *Should there be a Fifth Framework Programme? If so, what should be the main objectives or focus and how should the priorities be set?*

6. We strongly support the introduction of a Fifth Framework Programme. As we have said, support for research is crucial to economic competitiveness. However, as Edith Cresson herself has stated[1], only 2 per cent of European Gross Domestic Product (GDP) is being spent on research, while in the United States and Japan the figure is 2.7 per cent. This is a difference between Europe and the United States of more than 40 billion ECU per year, so representing significantly less research effort at the outset, irrespective of how good the EU is at exploiting the benefits of research.

7. The Office of Science and Technology (OST)[2] has concluded that "there is no case for an increase in the present level of the EU's funding for RTD . . . The overall budget for FP5 should not be greater than that for FP4". By contrast, we believe that the relatively low level of EU investment in research, compared to competitors, presents a strong case for some increase in funding for FP5, targeted on clear priorities and with allocations made on strict merit.

---

[1] Interview in "Innovation and Technology Transfer" Special Issue, February 1996, pages 3–5.

[2] UK Position Paper on a Fifth Framework Programme. Office of Science and Technology, Department of Trade and Industry. June 1996.

8. The main objectives of FP5 should be, as with the previous Programmes, to support the social, economic and industrial objectives of the Treaty. As before, the central impetus should come from the commitment to improve European competitiveness and—of overriding importance, in our view—to enhance the quality of life of all the EU's citizens. We believe that FP5 should continue to be organised in terms of science and technology objectives, since these are essential to promote the ground-breaking research needed to maintain competitiveness.

9. CVCP would wish to see the detailed breakdown of specific programmes dropped so leaving it to researchers to propose projects against much broader programme themes. We recommend that there should not be a significant move to a smaller number of large programmes under FP5.

10. We would not wish to see too many large consortia since these can be difficult to manage and can stifle wider participation across the regions. There is also a risk of excluding novel or unusual projects and the range of training programmes can be reduced.

11. The precise objectives and focus for FP5 should be determined through extensive consultation within Members States. In the UK, we welcome the OST commitment to wide consultation with the UK research community and industry. We would wish to see greater integration of FP5 with national research programmes and initiatives. For the UK, the Technology Foresight process created a framework through which to gain early notice of emerging key technologies and to help forge partnerships between scientists and industrialists. This has resulted in a greater common understanding of the trends and uncertainties involved in future technological developments. This process could, with benefit, be drawn upon by the EU in determining priorities for FP5.

12. We would like to see societal needs given more weight in determining programmes. This would help to gauge the public significance of programmes and user benefits. It would also provide another basis for evaluating project achievements or impacts. User benefits have, to some extent, been built into FP4, but more could be done to ensure that users are involved right from the start to finish of a project. For example, before a funding decision is made about each technological project, there could be a requirement to state what the potential benefits to users will be and how the results will be communicated to them.

13. There should also be a greater emphasis within the Framework Programme on improving public understanding of science and technology. This might help to secure better public support for investment in FP5.

14. Until now the main emphasis within the Framework Programmes has been on promoting technology that will improve EU competitiveness. But the emphasis is now beginning to shift towards assessing the social factors that underpin and impact upon technological development and on securing higher quality of life for all the EU's citizens. In this the social sciences has a crucial part to play. We were, therefore pleased that FP4 included a specific socio-economic research programme (though its scope was limited). Under FP5 it is vital for a social science element to continue and expand.

15. Europe is becoming an increasingly important arena for public and social policy making and for the development of economic and business strategy. Social science can help understanding of such things as economic growth (its sources and implications), urban development, unemployment, and the effects of international links and relationships on national competitiveness.

16. Moreover, some of the key challenges arise at the interface between science and technology and the social system. To underpin and support the advancement of science and technology, there needs to be greater understanding from the outset of the society in which we live and of public attitudes and behaviour towards science and technology. This requires investment in high quality research which offers insights into social processes and is able to assess the social, economic, ethical and environmental implications of new technologies and likely public reaction. Failure to examine the likely take-up of new technologies by end users is short-sighted and can waste investment.

17. For socio-economic research, the UK Economic and Social Research Council has developed nine themes which highlight cross-cutting issues of relevance to the overall Programme objectives of contributing to competitiveness and quality of life. The priorities are inter-related with the UK Technology Foresight Programme. These are an example of how the EU might construct a basis for a social science component of FP5. The nine themes are:

- Economic Performance and Development
- Environment and Sustainability
- Globalisation, Regions and Emerging Markets
- Governance and Regulation
- Human Communication and Social Shaping of Technology
- Innovation, Organisation and Business Processes
- Lifespan, Lifestyles and Health
- Social Integration and Exclusion

18. We suggest that the Commission should consult with Member States on how best to define and organise social science research within FP5. We believe that, in some instances, it will be most appropriate to integrate social science with the science and technology-led programmes; in others, social science should be funded as a discrete element in its own right. For example, we believe that research into economic performance and development, governance and regulation, and social integration and exclusion would all merit discrete funding.

19. Under FP5 we consider that new European investment in the humanities should be introduced. Ethics, heritage studies and archaeology are particularly important areas of humanities research for which we believe EU funding should be provided. In each of these there is an important European dimension. We need to understand better the European culture in which we operate and the implications of our respective national heritages and value systems.

Question 3: *What should be the balance between basic and applied, pre-competitive, and near market research funded through the Fifth Framework Programme?*

20. We acknowledge that national Governments should be the prime funders of basic research. But we believe that there are some areas of basic research which are of a strategic nature and should be funded on a European basis because there is clear added value from doing so. It is essential, therefore, for strategic basic research to feature strongly in the FP5. It is this that has provided the foundation for applied research, and will continue to do so. By fostering strategic basic research, the EU will also foster the Treaty objectives of improving competitiveness. We support the OST's view[3] that the UK Technology Foresight study has identified areas of science and technology in which, in particular, more strategic basic research is needed which might receive European funding.

21. FP5 should support applied research, but as we suggest above, there should be greater integration with national research programmes in this. Pre-competitive research should continue to be a key focus in FP5, since this is likely to attract industrial partners and encourage exploitation of new technologies. We do not believe that near market research should be funded under the Programme.

Question 4: *What should be the role of the Task Forces in a Fifth Framework?*

22. The role of the Task Forces is unclear. We are not convinced that they have provided added value and question whether they should continue at all. We would prefer to see strengthening of existing procedures for determining priorities within the thematic programme areas, assessing project proposals, and monitoring and co-ordinating programmes to ensure that worthwhile projects do not fall between specific calls for proposals.

Question 5: *Can it be demonstrated that the UK gets clear value for money from participation in the Framework Programmes and, in particular, what has been the impact on industrial competitiveness, social and economic factors?*

23. We believe that the UK does get value for money from participation in the Framework Programmes. UK universities have participated fully in Framework Programmes 2, 3 and 4, subject to the UK's own funding constraints (paragraph 30–31), and have secured a high level of funding under them. This is testimony to the quality of the UK research base. Each Framework Programme has made a significant contribution to the critical mass of research in the UK, resulting, especially, in employment opportunities and investment in equipment. It would be detrimental to the UK science base, if there were not a FP5. For example, one fairly typical large research-orientated university attracts around 9 per cent of its total research income from EU funded projects.

24. The Programmes have also given UK universities access to a broad range of industrial applications and interactions and have enabled extensive participation in European consortia, often as prime contractor. Such wide exposure to European universities and industry has enhanced the quality, scale and scope of the UK universities' research base.

25. In return, we believe the EU gets good value for money from investment in UK research and should therefore seek to sustain and enhance strong UK university participation in FP5. This is because of the world renowned strength and quality of the UK's science and engineering and its world class social and economic research, as evidenced, for example, by recent UK Nobel Prize winners[4].

---

[3] UK Position Paper on a Fifth Framework Programme, Office of Science and Technology, Department of Trade and Industry, June 1996.

[4] Professor Kroto, University of Sussex, for research of Buckyballs and Professor Mirlees of the University of Cambridge for economics research.

26. Expenditure under FP5 should continue to be justified on subsidiarity and value for money grounds. It is essential for programmes to ensure demonstrable European added value. However, we would be concerned if the quality of what was funded at European level was lower than that funded in the UK. Europe cannot afford to invest in second best.

27. The UK science base also obtains good value for money from the use of the large scale facilities, or other elements of infrastructure, that are supported with Framework funds because individual states cannot afford them. We support continued funding for such facilities under FP5, so long as this is clearly targeted. EU funds could also be used for Fellowships to enable the best European scientists and students to train to use the large scale facilities. Effective management and evaluation of such facilities is essential to assess the value for money from EU investment. A cycle of 5 to 10 year reviews of the facilities might be instituted. There should also be "sunset" clauses to prevent major facilities gaining a life of their own beyond their value. More central facilities should be sited in the UK, because of the strength of its science and engineering base and hence the value for money obtained from doing so.

28. UK universities have obtained good value for money from the Training and Mobility of Researchers (TMR) Programme. We strongly support its continuation and enhancement under FP5. The TMR provides a unique springboard for the training of high calibre researchers early in their careers who then, often, move on to more senior research positions. It exposes researchers to a wider range of experience and knowledge and helps the social cohesion of the EU. Concerted actions and networks can also provide good value for money for research groups. Networking can be of particular benefit for training younger researchers.

29. Robust and effective post hoc evaluation and monitoring of programmes is essential for determining value for money to the UK and the EU. Under FP4 new procedures for this were established whereby each programme was evaluated by three independent experts from academia and industry. The Commission also undertook national impact studies and have started to issue annual reports on research and development across all programmes. It is also evaluating the previous Framework Programme to learn lessons for FP5. We welcome these improvements and would encourage continued strengthening of such systems to assess project outcomes and value for money. Careful consideration should be given to the most appropriate time to evaluate.

30. The contribution from the Commission to indirect costs is exceptionally low and means the level of subsidy required from the UK science budget, and from the higher education funding councils' grants, is unacceptably high. This puts pressure on the universities' research infrastructure and can squeeze out research in novel areas or small research teams. There are also additional overhead costs in the early stages of forming consortia. We consider that the level of overheads that universities can claim from the Commission, when using the marginal-cost basis, should be increased to the equivalent of 45 per cent on direct staff costs, as is expected shortly to be the case for UK research council funded projects[5].

31. The Commission has argued that there is no evidence that the level of allowable overheads is acting as a disincentive to universities, including those in the UK, participating in the Programmes. However, the UK universities are being forced to compete for EU funds because of the ever more difficult higher education financial position. We also believe that over-subscription to the Framework Programmes would have been even higher if the overhead position were more generous.

PRIORITIES

Question 6: *What should be the role and priorities of the Joint Research Centre, and how should its activities be funded?*

32. We have concerns about the accountability of the Joint Research Centre (JRC) and are, therefore, pleased to know that an expert group within the Commission is examining the JRC and will report by the end of 1996. The JRC needs to have clear objectives that are in line with the Framework priorities. The emphasis should be on funding high quality science for which there is customer demand. JRC should also promote transfer of technology and joint ventures. More should be done to publicise the role and activities of the JRC. Funding for JRC should no longer be top-sliced from the Framework Programme. Under FP5, the JRC should compete for research contracts along with all other research organisations. We are also pleased that the JRC has now been integrated into a new monitoring and evaluation scheme. The JRC should be abandoned if its management is not substantially improved as a result of all of this.

---

[5] Following the Coopers and Lybrand report for the Office of Science and Technology *Review of the Dual Support Transfer*, Final Report, November 1995.

Question 7: *How should the EU meet its cohesion objective of enabling SMEs and Member States with less scientific expertise to benefit from the Framework Programme, while ensuring that the highest scientific standards for EU research are met?*

33. We recognise that SMEs have an important role in innovation—the successful exploitation of new ideas—across a range of goods and services. There are major problems in the UK, and across Europe, in stimulating SME participation in EU research. The Association of Independent Research and Technology Organisations (AIRTO) seeks to facilitate SME access to science and technology, as do the UK universities. But there are limits to what they can achieve given the sheer number of SMEs. It is often difficult for SMEs to obtain access to programmes other than through the supply chain of a multi-national company. It is clearly not cost-effective to involve SMEs just for the sake of it and there should not be undue restrictions placed on projects simply to incorporate the perceived needs of SMEs. Priority should be given to the quality of partnerships in R&D projects whether with large, medium or small companies.

34. One means of attracting SMEs may be to compensate successful applicants for the effort of putting a project proposal together. Streamlined and simplified administration would also help them. On the whole though, rather than looking for ways to stimulate SME demand, we believe more emphasis could usefully be given to the other roles SMEs could play in innovation—a view put forward by the OST[6].

35. CVCP has had some concerns about the extent to which geo-politics influences project funding decisions. The Commission has assured us that preference is not given to less favoured regions. The key criterion is scientific excellence. We believe that geo-political considerations should be met from regional funds rather than from the Framework Programme funds. Less favoured regions should also benefit from access to large scale facilities.

FUNDING AND ADMINISTRATION

Question 8. *Does the Commission have the adequate expertise and the mechanisms to support the Framework Programme?*

36. The Commission has made some progress in improving the administration of the Framework Programmes. We recognise that procedures will always be reasonably complex because of the need to reduce errors and the risk of fraud. There is, however, still scope for reducing bureaucracy further and streamlining procedures through common formats and improved communications. Some practical suggestions on this are given in paragraph 5 above.

37. We do not support delegation of more Framework administration to Member States. The objectives of the EU are not best served by such fragmentation and there is a risk of parochial attitudes developing; after all this is a Community Framework, not a national funding regime.

Question 9: *Is the current length of the Framework Programmes too long and would they benefit from shorter time frames with more flexible funding? Alternatively should the Programmes be longer?*

38. The current length of the Framework Programmes—five years—is about right. An equally important issue is Programme continuity and the need to ensure a smooth transition from one Framework Programme to the next. There was an unhelpful gap between FP3 and FP4 which should not be repeated for FP5:

Question 10: *Should the Task Forces have ear-marked funds to support their own research programmes?*

39. The Task Forces should not have funds to support their own research programmes. As we have said above, we question the value of them at all.

Question 11: *How should the UK allocate funding for the Framework Programme and other EU research initiatives to ensure that UK researchers are not disadvantaged?*

40. Total spending in the UK and EU on support for the research infrastructure is at a low level relative to competitor economies. It is essential that the UK Government provides adequate support for the national research infrastructure so that the UK is well placed to compete for EU research funds. Moreover, Framework Programme funds must not be viewed as a substitute for national funding, they must be truly additional.

---

[6] UK Position Paper on a Fifth Framework Programme, Office of Science and Technology, Department of Trade and Industry, June 1996.

41. Under FP4 funding between the EU and the UK universities is deemed to be outside the scope of VAT. This is because the funding is provided for "the common good" rather than a contract for the supply of goods and services. If there is no supply to the EC, there is nothing to zero-rate, and the UK cannot introduce new zero-rates. As a consequence UK universities sustain irrecoverable input tax. If this position could be changed then it would help to improve the UK's universities' funding prospects.

Examination of Witnesses

Professor T M Husband, Vice-Chancellor, University of Salford, Professor R Sibson, University of Kent at Canterbury, and Professor R C Floud, Provost, London Guildhall University, Committee of Vice-Chancellors and Principals, called in and examined.

Chairman

357. Gentlemen, we are very pleased that you have been able to join us. I wonder, Professor Husband, whether you would first of all like to introduce yourself and your colleagues and then perhaps you may wish to say a few introductory words?

(*Professor Husband*) Thank you very much indeed, my Lord Chairman. It is a great pleasure for the three of us to be here this morning and to present some evidence from the Committee of Vice-Chancellors and Principals. I am Tom Husband, Professor Husband, and I am the Vice- Chancellor of the University of Salford, which is in Greater Manchester. Professor Floud is Provost of London Guildhall University. Professor Robin Sibson is Vice-Chancellor at the University of Kent. My Lord Chairman and members of the Committee, you will know, I am sure, that the Committee of Vice-Chancellors and Principals is not noted as a homogeneous body. There are many times when it is difficult to reach a consensus because there are over 100 higher education institutions now represented by the CVCP, but in this particular context and this particular arena I think that it is fair to say that there is a good degree of consensus about Framework Programme V and about research funded by the European Union generally. We have had a steering group of six vice-chancellors including the three here this morning, and we have taken good inputs from 24 universities up and down the country. Some of us have been to Brussels and have met up with Professor Routti, who I know has given evidence to your Committee in recent weeks, my Lord Chairman, and we took the opportunity to meet relevant senior officers of Directorate General XII and other agencies in Brussels. May I just say to the Committee, my Lord Chairman, that the evidence that we have produced and put in front of you, the CVCP evidence, was compiled before the Commission published its recent working paper which is seen as additional material to augment the document which, as you will know, is entitled Inventing Tomorrow. We produced our evidence at a stage when we were not aware of how Professor Routti *et al* would make proposals regarding the programme as a whole and, as you know, he is proposing a sort of three by three matrix, the three priority topics and three horizontal activities. In very general terms, my Lord Chairman, we are reasonably happy with these, but perhaps you might want to explore with us some of the details of that. Perhaps by way of introduction, my Lord Chairman, you might allow me just to draw out some of the key strands of the CVCP evidence. We do believe that from our experience of the previous Framework Programmes that Framework Programme V have a clearer rationale for focusing programmes and have permanent aims and objectives. We are still concerned as British universities that there is too much bureaucracy and that further improvements are required in that regard. We disagree with the Office of Science and Technology in one very important dimension, that is to say, in looking at the relatively low level of European investment in research compared to the competition in the United States and Japan, we believe that there is a very strong case for some increase in funding for Framework Programme V. As you will know, my Lord Chairman, the Office of Science and Technology take the view that Framework Programme V should be funded at a level not greater than Framework Programme IV. We believe that there should be a strong social science element running through the Framework Programme V, perhaps a golden thread, but also with some discrete social science projects, and we can say why in some detail, my Lord Chairman. It is essential, we think, in accepting Framework Programme V that it is not about blue skies research, neither is it about near market research; it is pre-competitive and it is applied, but there is scope in our opinion for some fundamental or basic research as long as the fundamental research is strategic to the underlying aims of Framework Programme V. We are very keen to support the TMR Programme—the Training and Mobility of Researchers—which we think has been a great success thus far. We are concerned—and you will not be surprised to hear us say this, my Lord Chairman—that the level of overheads that universities can claim from the Commission needs to be increased. We are a little bit concerned about the emphasis on small and medium sized enterprises. It is obvious that small and medium sized enterprises are crucially important in innovation, but in our view to design programmes which involve SMEs just for the sheer sake of involving SMEs is mistaken. We still believe strongly that priority must be given to the quality of the research based on the quality of the partnerships whether these are with large, medium or small companies. Finally, my Lord Chairman, again you will not be surprised to hear us say that in our view it is absolutely essential that the British Government provides adequate support for the research infrastructure in this country so that British universities are well placed to compete for European funds.

358. Thank you, Professor Husband, for that helpful introduction, and thank you for the written evidence that we have had an opportunity to consider. Let me then ask the first question, picking

Chairman *contd.*]

up your point about the need for a clearer rationale for the Framework programme. Let me ask how you would set about doing this. How do you determine priorities in the Framework Programme, how would you like to see them determined?

(*Professor Husband*) My Lord Chairman, perhaps one of my two colleagues would like to have an opportunity to speak. I think that the priorities must be related to European competitiveness, but more importantly or, rather, more essentially, there should be a clear objective to involve a better understanding as to how science and technology and research science and technology relates to the citizens of Europe and to the quality of life and allows the European citizen to have a clearer understanding of what science is about and why it is important, so we want that, and that is very glib and very easy to say. When we look at the three by three matrix which Professor Routti has proposed, the three topics are very, very general and the three horizontal activities are difficult to disagree with. In my own opinion, and I think perhaps my colleagues would reinforce this, the three by three perhaps does offer a good enough rationale. The next step is the important step, to define a particular research project within that three by three. If you took one of the three horizontal activities, for example, one of them is to develop a user friendly information society and you can see that universities in particular but partnerships generally see this very, very flexibly: you could run a horse and cart through it. What does it mean, "user friendly information society"? We could do some very, very useful research, but I think that it needs to be very carefully focused and targeted, and I personally believe that if we were going to do that we should actually try to look as far away from the market place as possible and keep it as basic and fundamental as possible.

(*Professor Sibson*) My Lord Chairman, if I may add to that, the Committee of Vice-Chancellors and Principals would be absolutely adamant that whatever is supported through the Framework Programme should be supported on the basis of excellence. Regardless of the way that the objectives are set out we would not wish to see anything second rate supported simply for the purpose of matching the objectives.

(*Professor Floud*) My Lord Chairman, if I might add one other point, I think that the experience of many research programmes is that what one ought to try to avoid is what one might call disciplinary capture. That is, I think that the focus of a European programme should be to add value to what goes on in individual European countries, and that is most likely to be achieved either by the mobility aspect or by new ways of looking at new problems. Therefore what one should try to do is to devise programmes which do not simply say "we will fund training in physics, we will fund research in physics" or "we will fund research in engineering", but one will try to look for new ways of organising things, new themes which will ensure that scientists from different disciplines and from the social sciences and humanities actually work together across the European Framework.

Lord Lewis of Newnham

359. My Lord Chairman, I am slightly concerned. It seems to me that the Framework Programmes were in many ways directed towards industry.

(*Professor Husband*) Yes.

360. Much of what you are saying seems to me to be the *cri de coeur* of a university, and that I understand and I appreciate that, but it does seem to me that the ideas that you are projecting here are going to be very much more university orientated than industrially orientated. I could be wrong, and I would love to be denied that particular point. For instance, you make the point of social science and I would like you perhaps to amplify how you view this within the terms of essentially an industrial organised programme?

(*Professor Floud*) Perhaps I could approach it obliquely, my Lord Chairman, and say that a similar set of approaches within the British contexts to the Technology Foresight exercise began with the view that you should look at technological solutions to problems and solutions that would benefit industry and ended in many cases with the view that in order both to understand the causes of the problems that you were investigating and, indeed, to achieve public acceptance of the solution, you had to have a strong social science component to the research programmes and to the directions of expenditure which came out of it. In other words, in order to fight crime you do not merely build better burglar alarms but you also try to understand the causes of crime and how to prevent it.

Lord Craig of Radley

361. You talk about Framework Programme V having a clearer rationale. I want just to be clear in my own mind, my Lord Chairman: are we talking about that in relation to the setting up of Framework Programme V or as a comparison with Framework Programme IV? Secondly, because I think that it is probably easier if I have two bites of the cherry now, one of the things, of course, which we have been led to understand is that whatever research is undertaken under these Framework Programmes they should be on a European scale, in other words, that they are to be related to research which can only be done at a European level rather than at national levels. That seems to me a fairly clear rationale to how you spend money. Do you agree with that rationale, are you quite comfortable with that? Does it in fact inhibit any of the work that you see going forward?

(*Professor Husband*) My Lord Chairman, if I may take the first question, certainly when we argue for Framework Programme V being more rational and clearly focused we are talking with respect to Framework Programme IV and perhaps also to Framework Programme III, but Framework Programme IV in my opinion has been characterised by very large consortia doing really rather unfocused working in some parts of the programme. The bit about research on a European scale, it is quite clear to us that the Community would only want to do funded research where the European dimension of it adds value. It is because it is European that it is worth

Lord Craig of Radley *contd.*]

doing rather than simply doing it in, say, the United Kingdom or in another Member State. It comes back to the subsidiarity business of added value as a result of doing the research in Europe. I think that that is absolutely important and crucial.

362. And in the sense that one is looking for the best quality research—I am just probing this area; are there any conflicts between being sure that the quality research that is being done can best be done under what are frankly fairly diffuse arrangement, however you cut it, because there is the need to bring in a variety of countries and a variety of research institutions and so on. There are a lot of things to be melded together over and above the matrix which you have already identified.

(*Professor Husband*) My Lord Chairman, I think that that is a very good point. Perhaps one could be honest in responding by saying that the university community and, indeed, the British industry community involved in Framework Programme IV, have been known to make criticisms that in some instances we think, or we thought anyway speculatively, that Framework Programme IV research was being funded on occasion to suit less favoured regions rather than being funded on the quality of the research. We have argued very strongly, and my colleague has just mentioned it, that this must not be the case. Needless to say in Brussels we were absolutely reassured that the less favoured regions are not favoured in the Framework Programme research funding but are in fact supported by structural funds. We have to accept their word for that, but there has been some doubt in the university community certainly about whether the quality across the whole community and the ability to do high quality research is actually in place. We are reassured however that unless it is high quality research it is not funded irrespective of which geographical part of the community it is.

Lord Haskel

363. My Lord Chairman, Professor Husband spoke of the Framework Programme being focused on the need for European competitiveness. It has always seemed to me that it is companies that are competitive rather than countries or communities. I wonder how you can see the Framework Programme helping companies to be more competitive because at the end of the day it is them who have to go out and get the business and do the orders and be competitive.

(*Professor Husband*) My Lord Chairman, competitiveness, of course, implies inward investment and it implies protection in a nice sense of the word of European industries and quality of life of European citizens. Research of the kind related to the Framework Programmes is the kind of research which we would hope would generate generations of well trained, well qualified people who are not necessarily university researchers but are actually leading edge thinkers who can work in the context of industry. Indeed, one of the great strengths of Framework Programme IV and previous Framework Programmes is the generation of industry-academic co-operation and partnerships. It is no accident that huge corporations like Siemens and Fiat and Volkswagen and GEC are involved in Framework Programmes. It is very much in their interest and in turn, of course, it makes it in the interests of all of us.

(*Professor Sibson*) My Lord Chairman, may I add to that that I think that European competitiveness may also relate to networks of companies competing with one another or forming supply chains. We have seen a very good example of that in the development of Silicon Valley in the United States. Individual European countries may well be too small for some of those networks to develop successfully without a European dimension of the kind which is provided by the Framework Programme.

Lord Gregson

364. You say in effect that you are somewhat concerned about the smaller, poorer countries taking part in research programmes which is exactly the criticism that the Germans have made of this situation, as you are probably aware. In fact, they are suggesting that this is done to encourage the developing countries in Europe and is embodied as a prime factor into the whole idea of the Framework Programmes. If you remember it was laid out originally in the resolution that went before the Council of Ministers which included a sentence regarding encouragement to smaller countries, etcetera. That does not necessarily line up with the way that the Germans want to see this approached. One can understand that, of course, because in terms of a research programme it does not make sense. What you are really suggesting is that there ought to be two programmes, one a research programme absolutely underlined as a research programme and one which is an educational programme to bring smaller countries up to speed. That is what you are implying, is it not?

(*Professor Husband*) Well, I would feel uncomfortable if it went as far as that. Lord Lewis made a very good point earlier on that because we are coming here today talking from the viewpoint of the Committee of Vice-Chancellors and Principals it is inevitable that we speak strongly about universities. I do agree—I know exactly what Lord Gregson is pointing up to. It could be argued that there are in existence other programmes to educate in quotation marks or bring up to the same level the so-called less favoured regions and, indeed, the programmes like Erasmus and the like are just like that. The worry that I would have is not so much that we need two programmes but that if we are going to have a good, strong Framework Programme the quality must be strong right across the board. If that means that some of the so-called less favoured regions are unable to participate, then so be it, but to encourage these nations actually to make maximum use of the other parallel programmes which have to do more with straightforward education and training rather than try to split it into two programmes.

Lord Phillips of Ellesmere

365. It never fails to amaze me, Professor Husband, that people in your sort of situation go on it sometimes seems endlessly about the recovery of overheads. What I think that you really need to be concerned with is who pays the full economic costs of the work that you are doing because if you do not receive the full costs of the work that you are doing, in the end you will go bankrupt. You mentioned overhead recovery in your introductory remarks. Therefore, taking into account the fact that in the previous Framework Programmes there have been difficulties about recovering VAT you are not actually allowed, as I understand it, to ask for full economic costs. You spend a lot of time and effort in putting together proposals which involves collaboration with your prospective partners. There is at the end of that process a rather limited chance of success. If you do not succeed, then—the cost/benefit ratio—your costs are considerable but the benefits are, shall we say, intangible, so the cost/benefit ratio is a little indeterminate, but at the best what do you think the cost/benefit ratio is?

(*Professor Husband*) Let me do the usual academic cop-out, my Lord Chairman, and say that to have a cost/benefit assessment is not very appropriate because it is very difficult to quantify the benefit—it is not like a good in service—but just to try to put some hard facts on it, in my own university if we have a contract with the European Union for £100,000 we get £15,000 back in overheads, but we have already spent usually £2000 in set up costs.

366. I am sorry, if I may interrupt, can you say what that actually means? You get a bit of extra money to spend on what?

(*Professor Husband*) My Lord Chairman, I am coming to the bottom line which means actually agreeing with the implication of Lord Phillips' question. There is no profit here. It is actually bad business in quotation marks because a £15,000 overhead does nothing really to recover the full cost of the academic who is not being paid for doing this—it is a research assistant—but there is usually £2,000 so-called up front cost, £500 for a visit to wherever you are going to meet the potential collaborator or whatever, so you have spent £2,000 out of your £100,000 and you are going to keep £15,000 to pay for the photocopying and the telephones, etcetera, but that in no way covers the full cost. In the main it is money in and money out. I think that what you are then saying is, why do you do it, you must be mad to do it, and it is costing the British taxpayer to do it. There are a number of arguments—you would not want to get too bitter about it. The British university system is in some financial difficulty and it has been for the last few years. In truth many universities are driven to look for every revenue stream that is available—even if it is not a profit it is a contribution to the overheads. The success rate is at the moment one in six (actually, one in six is not too bad compared to some of the research council programmes in Great Britain) and also in most cases the costs which are associated with an individual university making a bid to Europe tend to be marginal costs for a very good reason in that very commonly the bid that is being made by an academic plus his industrial collaborators is lifted in part from other bids for other funding sources, from industry perhaps in the past or a recycled bid from a previous project or from a rejected research council bid or whatever. It is very unusual actually to start ab initio and say, "I shall write a bid for a particular project". Therefore, as a business prospect if you were running this commercially you certainly would not want to do it, but the qualitative benefits are really quite substantial in that it allows the networking with researchers in Europe that you might not otherwise come across and with industrial strength which might not exist in this country and therefore gives you a stronger research base in your own university, and, of course, it brings on young researchers and gives them an opportunity which frankly is getting less and less available through the British system.

Lord Craig of Radley

367. To what extent does it cost you money from your university funds actually to accept a grant from the Framework Programme? As I understand you, you are suggesting that it does cost you money but it is worth doing because of these extra benefits?

(*Professor Husband*) Yes, intangible benefits.

368. Well, they may be intangible. In cost terms it may not be very easy to put a value on them, but surely they do have a value and you, as the universities, must benefit as a result of what you call intangible activity?

(*Professor Husband*) Of course we do.

369. In which case—and you are accepting these Framework Programmes?

(*Professor Husband*) Oh, yes, yes.

370.—even if you say you are not taking a business line by doing it, I believe that you are.

(*Professor Husband*) Well . . .

(*Professor Floud*) You are certainly deriving benefits from it, but I think that you do have to consider—to go back to the previous question—where those are coming from and essentially the answer is that they are being subsidised by other university activities. You have to take the enterprise as a whole, and I think that what we are really saying is that in many cases the direct costs of a particular research project are not covered. I think that there are ways, my Lord Chairman, if I may go back to the question of the low success rate, which is certainly a very substantial problem, and this does, as Professor Husband said, characterise almost all the research grant programmes so that one gets used to making unsuccessful applications and, as he said, you tend to re-cycle the applications. This sounds very cynical, but that is essentially what happens. People have a good idea, they seek for somebody who will fund it, and they will go to one programme or another and they will be inured to making unsuccessful applications. This is very time consuming. I have a colleague who is in fact a Nobel prize winner in economics who argues that with a large research group you are likely to spend one third of your research time on making applications and you will perhaps be successful in one out of three or one out of four applications even at very high levels of expertise and excellence. Therefore, this is nothing new as far as the Framework Programme V or Framework Programme IV is concerned. What I

Lord Craig of Radley *contd.*]

think that we are suggesting is, as we say in our evidence, that you can actually cut down the costs of the unsuccessful applications by a two or even a three stage process in which you vet applications at an early stage in outline form and you then ask people to make more detailed applications so that some of the costs at any rate can be put off to a later point, a point at which there is a greater chance of success. Certainly the ESRC uses such methods in commissioning research programmes and that has reduced very substantially the cost to universities and researchers of making unsuccessful applications.

Lord Lewis of Newnham

371. My Lord Chairman, may I just ask a supplementary on that point. I am slightly confused. My experience has been that although it is expensive to be putting in projects the real problem is when you are actually running the programme and your overhead is not very important there and is acquired in some other way, in which case this particular aspect becomes rather a minor aspect of the whole business financially speaking. When we talk about overheads I have a lot of sympathy, I think, with what Lord Phillips is saying here. It really is getting down to the costing of it. How far is this a problem with other Member States because one gets the impression when one goes to Brussels that when the word overhead appears they immediately allocate this to the United Kingdom because they do not seem to feel that this is a problem that occurs in other Member States. If this is true, then there must be a solution that has been found by the other Member States. I have a shrewd belief as to what that is, my Lord Chairman, but I would like to hear the views of the Committee of Vice-Chancellors and Principals on it?

(*Professor Husband*) My Lord Chairman, it is only anecdotal. You are absolutely right. When we were in Brussels in the summer and we talked about overheads, the officials and others and Members of the European Parliament, for example, said, "We only ever hear this from British universities". Anecdotally my own knowledge of German universities would suggest that the overhead problem is less important to leading German universities because of the infrastructure support that they are getting from their federal government as well as their state government. That sounds terribly like special pleading, and it is very anecdotal. If that is true, and let us say that it is true in Germany, I would not know whether it is true in Italy, for example. I really have no knowledge, my Lord Chairman.

372. My Lord Chairman, I think, if I can remind you, that there was a big problem that came in the mobility programmes relatively early on when in fact vast amounts of money were being allocated to post-doctoral people of the order of £35,000 to £40,000 a year for which we were getting something like 2 or 3 per cent back in the universities from the point of view of running the whole operation and being placed in the ludicrous situation of offering this sum of money to a post-doctoral at the age of 27 or 28—very often more than the professors in the department were earning—and I think that this was taken to task. I think that there has been, if I understand it correctly, my Lord Chairman, a reasonable solution found to this. Is this not just another example of this particular problem that it requires negotiation at two fronts, one is certainly Brussels, but the other one is back in the United Kingdom.

(*Professor Husband*) Yes, my Lord Chairman, I would agree with that. It is analogous to the VAT problem, which seems to be peculiar to Great Britain.

Lord Phillips of Ellesmere

373. My Lord Chairman, if I may just come back to this problem, you are under continuous pressure in your funding from the funding council in particular which is where the so-called free money exists that enables you to take on what are in effect loss-making contracts, you are under continual pressure to make efficiency gains in the use of that money, 2, 3, 4, 5 per cent per annum, and you keep on doing that, but there is a limit to how long that can go on?

(*Professor Husband*) I agree entirely.

374. What do you think that the United Kingdom should be proposing—let us get down to practical terms—to the European Commission about the terms under which these Framework Programmes are financed that would get you out of this difficulty?

(*Professor Sibson*) My Lord Chairman, we felt that it would be helpful to try to calibrate this problem for the Committee by making a comparison between the rate of return on a European project and that on one funded by the UK research councils. The rate of overhead on a UK research council project has recently been increased to 45 per cent and it is on the staff—

375. If I can interrupt, my Lord Chairman, we are back with this overhead concept. That is overheads on the salary costs, and I am no more in favour of that than I am of the concept in the Framework Programme. What we are talking about is, what are the full economic costs of doing the job, can you specify them and ask for them?

(*Professor Sibson*) My Lord Chairman, if Lord Phillips will bear with me for a moment I am not an advocate of the overhead model, but that is the model with which we are working and I am trying to make some degree of comparison as between the European and the UK funding. If we say that in a typical project two thirds of the total costs are staff costs which is a figure that one can argue about but may be typical in many cases, that means that on the total cost of the project the UK research council would provide 30 per cent overhead for general costs. The comparable figure for European grants is 20 per cent. I think that that does give some measure of the difference, my Lord Chairman. This is pointed up even more dramatically when you make a comparison with the grants that UK universities receive from charities which typically carry no such overhead at all. I think that many UK universities would feel that there was far more pressure on them when they accepted grants from the major medical charities than when they accepted grants from the European Commission. Now obviously there are a

Lord Phillips of Ellesmere *contd.*]

number of qualifications which one can make to those figures, but I hope that they do provide an indication of the magnitude of the gap although, of course, I fully accept Lord Phillips' view that the whole mechanism may be one which in itself is not very satisfactory.

Lord Soulsby of Swaffham Prior

376. My Lord Chairman, just on this point about full economic costs and overheads, of course, one of the intangibles of accepting the grant is the research selectivity exercise, that you take it almost whatever the cost in order to get your ratings up and hence the reward that comes from that. Would that be a fair comment?

(*Professor Sibson*) My Lord Chairman, yes, it would.

(*Professor Husband*) It comes back to Lord Craig's point. It is maybe not all that intangible, but it is long term. In truth many university academics take the view that if they do not make a bid to the European Union obviously they are not going to get any money. Any monies which come will in some way help the research standing of a given department, as you say, of a given research group, but that might take four years to come through. It might not be intangible, but it is certainly very long term and not guaranteed because the researcher who has won it could be moved to another university in the four-year period.

Lord Craig of Radley

377. My Lord Chairman, we have also had in evidence from others that the award of a Framework Programme research grant can be the door opener to the award of additional funds. Really you have answered my question—is this your perception too?

(*Professor Husband*) Yes.

378. In other words here is another tangible or intangible benefit that you gain from the successful award of the Framework Programme grant?

(*Professor Floud*) My Lord Chairman, I think that we would all accept that there are intangible benefits and, indeed, there is the benefit of simply increasing the level of activity. If you believe that research is promoted by synergy and conversation between good people, then there is a strong argument for increasing the level of activity just in order to get more good people talking to each other. However, if I may express a personal point of view, my Lord Chairman, which is certainly not the Committee of Vice-Chancellors and Principals' view, I think that what Lord Phillips has said is basically that the current system of funding research in British universities in nonsensical, and I would agree with that if that is what he was saying. I think that we should go over to a system in which we properly fund individual research projects and we stop having these general subsidies to universities, but that is very much a personal view.

Chairman] I will resist the temptation to ask questions of Lord Phillips directly!

Lord Craig of Radley] These intangibles do not help at the bottom line.

Baroness Platt of Writtle

379. What feedback do you get when proposals are rejected?

(*Professor Husband*) My Lord Chairman, it is a bit patchy, but in the main it has been very disappointing. The Directorate General XII people do take the point that this has got to be improved. Maybe I can give you a typical response for a rejected bid. It is very reminiscent, if you get an A4 sheet of paper, of an MoT failure test where it normally says, tyres, exhaust, windscreen, and there is simply a tick in the box, so you get the one-page thing which has got all the criteria for that particular project in that particular programme and, where you have allegedly failed, there is a tick. Now that is not all that helpful.

380. No. What would be preferred—not too many sides of A4 but presumably a more discursive response?

(*Professor Husband*) Yes, it is not possible to have face to face, but a telephone call would not go amiss, you know!

Lord Lewis of Newnham

381. I would just simply like to take up the point made talking about total economic assessment for research and things of this nature. I understand what is being said and I have a lot of sympathy with what the Vice-Chancellor is saying, particularly Professor Floud. However, I am slightly concerned that we can end up with what I would like to call the American model where in fact vast sums of money are given to individuals who then develop what I would call the holy cow aspect of it and as the result of this they look upon themselves as special, they do not do any teaching whatsoever, they devote themselves totally to research, they make demands both within the department and within the university, which anyway to my mind is excessive. Does this particular model concern you at all?

(*Professor Husband*) Yes.

382. Because this seems to me the logical conclusion of what is being projected.

(*Professor Floud*) I think that it worries me, but it does not seem to me that it is a necessary consequence of a system in which you do fund good people. I do not know how far you wish to go into a discussion of the difference between British and American universities, but it seems to me that we are moving very much in that direction. We are certainly moving as things are at the moment towards a situation in which the best researchers are freed from teaching, the teaching is done by graduate assistants and so on, all the features that are familiar in the American model, and I think that that is really a characteristic in a sense of the over-emphasis on research and the under-emphasis on teaching which characterises most higher education. I do not think that it is a particular feature of the particular funding model.

Baroness Platt of Writtle

383. In your summary, in the first sentence, you feel that the Framework Programme is successful in encouraging industrial competitiveness. Now I read

Baroness Platt of Writtle *contd.*]

your submission to Dearing and I was rather surprised to see on the first page, "As a post-industrial knowledge-based society the UK must invest in the education and development of its citizens". I am wondering in that context what "post-industrial" means?

(*Professor Floud*) My Lord Chairman, I agree that there is a difficulty about "post-industrial". I think that it comes from focusing far too much on manufacturing as the source of economic growth and economic welfare. Britain has been a country with a very large and very successful service industry since the late 19th century and throughout that period Britain has continued to grow at an average rate of 2.5 per cent per annum over most of the last 150 years while running down the proportion of its population engaged in manufacturing and the proportion of its GDP that comes from manufacturing, so you can have a perfectly successful industrial economy with a smaller and smaller proportion of people actually engaged in manufacturing. There is no reason in principle why we should not entirely live on our wits, entirely live in terms of selling services.

384. We should have an enormous deficit, I feel, if we had been importing all our goods from somewhere else.

(*Professor Floud*) You would be importing goods but selling services. That, of course, is what the City of London has been doing and it is what the British economy has been doing for the last 200 years.

385. Would you not agree as universities that surely you should be educating students to revive our manufacturing industry? According to this, industrial competitiveness is important. Do you not think that it is?

(*Professor Floud*) I agree that industrial competitiveness is important, but I do not think that one should equate industry with manufacturing.

386. It surely must be a major part of it?

(*Professor Floud*) I think that what you should have is a balanced economy, but historically there are wide ranges of balanced economies and our current economy and the economy of the United States and the economy of many other countries is currently heavily based on the service industries as well as on manufacturing industries.

387. With a budget deficit every year in terms of importing the things although we have a good exporting industry?

(*Professor Floud*) We have had a negative balance of payments on visible goods for most of our industrial history. We have survived for the last 100 years by selling our services.

388. What I am really trying to get at is, surely there is a contradiction here? You do end up by saying that of course you have re-translated the meaning of industry and you say in the very last sentence that industry should therefore fund universities— I was rather surprised, in a post-industrial era, but never mind. Surely it is important to encourage students to feel that they could themselves in later years contribute to our industry becoming more successful because, as it is, the Pacific rim is doing the lot and, if we are not careful, we shall go down under the waves, I think, and become third world.

(*Professor Husband*) My Lord Chairman, I started out this morning by saying that the Committee of Vice-Chancellors and Principals is not necessarily homogeneous.

Chairman

389. I was wondering whether the University of Salford had a different view on this!

(*Professor Husband*) If I were to be parochial and forget the Committee of Vice-Chancellors and Principals and just talk about the University of Salford and speak as a mechanical engineer, speaking happily to another engineer, there are big chunks of the CVCP with universities like my own university who work—and take it as their main ethos—very, very closely with manufacturing industry as well as the service industries and we believe very strongly in training young people for a future in Britain which will involve high added value high tech industry which in the main will be manufacturing. It may not be manufacturing, but it will be high added value and it will not simply be a case of imported goods, so there is a slight difference there—but it is understandable, my Lord Chairman.

Chairman] I think that we have reached agreement on that, so I am going to move on now to Lord Soulsby.

Lord Soulsby of Swaffham Prior

390. If we may come to the Task Forces, and I note in your written evidence that you are not particularly in favour of Task Forces, does the current system of specific programmes actually stifle research on multidisciplinary themes and, if so, what should be done to address this problem? Might Task Forces with a different mandate do that?

(*Professor Husband*) My Lord Chairman, perhaps I may have a go at that. To a certain extent there is some confusion here. Perhaps we have contributed in large part to the confusion, my Lord Chairman. May we start with Task Forces. I do not think that the Committee of Vice-Chancellors and Principals is opposed in any way in principle to the concept of Task Forces, but it has just never been made clear to us what the Task Forces actually do and what they have achieved. We are slightly inclined to the view from experience within British programmes that in many cases instead of having a group, a Task Force or collection of people, it is very often better to have a single champion who actually runs with the project or programme and makes sure that it is co-ordinated, so to that extent if some co-ordination is needed we would like to see, if it has got to be a Task Force, it made much more clear what it is that the Task Force is doing and also we would like permission to consider moving towards project champions, as it were. The second bit of multidisciplinary is often confusing. I have to say that in Framework Programme IV, in the current Framework Programme, the programmes have been so broad and the consortia involved, universities and industry, have been so large that almost willy-nilly without

Lord Soulsby of Swaffham Prior *contd.*]

meaning to they have become multidisciplinary, but in a very haphazard way. I do not necessarily think that multidisciplinary would disappear by getting rid of Task Forces.

391. If I may just follow that up, my Lord Chairman, with the Task Force how would you like to see this operate from the beginning and then having made its decision be handed over to actual funding or the Task Force to take an interest in a multidisciplinary area right through the operation of that piece of research?

(*Professor Floud*) My Lord Chairman, I think the model that we had in mind was that there should be either a very small group or possibly a single person who is concerned with a particular programme or sub-programme throughout its life, that is, that that person should be concerned both with setting out the specific objectives of the programme from the beginning, then with looking hopefully through this two or three stage process at actual applications, and making the choices, obviously advised by the usual peer review processes, and then should take on the responsibility which is often the most onerous one of running with the projects while they are taking place and dealing with the problems as they arise. That is a model that is used by a number of British research councils and it seems to me to work quite well and that is the model that we are advocating.

392. Then one final point: would you allow the Task Force any financial inputs if necessary?

(*Professor Floud*) I think that they would need obviously to have some degree of discretion because, as we all know, during the life of a research project things change and you need to give them some discretion actually to change the funding in relation to whatever happens, whether it goes right or wrong.

Lord Porter of Luddenham

393. Paragraph 20 of your submission is all about the very important question of what sort of research is most appropriate for the Framework Programme. I must say that I find much of this discussion about as illuminating as I did the discussion on post-industrial society. It is a matter of definitions again. It was bad enough when we had basic and strategic and applied research, but now we join them together to a "strategic basic". Is there really anything except basic and applied, basic pure research, trying to improve our knowledge of everything and the application of that for a useful purpose in industry? Is there anything else? What is strategic for a start? Then, for goodness' sake, what is basic strategic?

(*Professor Sibson*) My Lord Chairman, I have volunteered to enter this particular minefield. Lord Porter is, of course, quite correct in identifying part of the problem as being terminological. We start from the point of accepting the principle of subsidiarity as applying to the Framework Programme. Now if we wish to argue about that principle we are arguing with one of the basic principles of the Commission, and I think that that goes beyond the remit of our presentation to you this morning, my Lord Chairman. Under the principle of subsidiarity there are a great many pieces of basic research which could clearly be identified as supportable through national channels and therefore could not fall within the area which could be funded through the Framework Programme. What we have tried to do, my Lord Chairman, is identify the area beyond that where one is looking at pieces of research which perhaps do not have an outcome which can be directly regarded as contributing to a specific objective but nevertheless will support the basic programmes within Framework Programme V.

394. I wonder whether you would just clarify what you have said. You said that there are subjects in basic research which are clearly identifiable as national, if I understood you rightly—not quite your words, but that is what you were saying. I can understand that in applied research. There may be applications which are specifically useful to a given country, but how can basic research be national?

(*Professor Sibson*) No, I am not saying, my Lord Chairman, that basic research is national. I am saying that there are areas of basic research which do not pass the subsidiarity test of contributing to European added value or the quality of life across Europe or having a European dimension in terms, for example, that one might say environment research would have a European dimension. Now one may or may not agree with that approach, but we believe that that is the way the Commission are interpreting the subsidiarity principle in this area and we feel that we should try to support the inclusion of research which is as close to being basic research as possible subject to not conflicting with this European principle. That was what we were attempting to capture in the terminology we have used in talking about basic strategic research or strategic basic research. I think that we have attempted something which is quite clearly difficult to get across, but I hope that I have given some flavour of why we have focused on this area as something that we would like to see supported, whilst accepting that the European Commission itself would rule out many areas which we would certainly want to see supported as research but we would have to accept needed to be funded through national channels. It is the national channels for funding, not the national nature of the research that I think is the important point to focus on.

395. So it would be unfair of me to interpret the problem as one that you have written off applied research and technology because that is industry and so on, you have written off basic research—at least, you have not—and therefore you are not going to get any money unless you have something else, so you slip in one in between called strategic basic?

(*Professor Sibson*) My Lord Chairman, I think that Lord Porter is taking a fairly extreme interpretation of our position in putting it like that. No, we have certainly not written off areas in that way, but what we have done is try to ensure that the programmes do include as much of what we would regard as basic research as can legitimately be funded subject to the constraints imposed by the subsidiarity principle.

Lord Phillips of Ellesmere

396. On a historic note may I remind you that for a very long period research was categorised in the way that appeals to my noble friend Lord Porter as basic research, applied research and then development. That incidentally conjures up a picture of the linear model that not many of us would approve of nowadays. In the 1970s Lord Dainton thought that this categorisation was not adequate and he introduced the term strategic to lie between basic and applied, but strategic was essentially basic research but for which one could fairly confidently say that in the medium term there would be practical advantages, applications, and that is true, I think, of most research, for example, in fundamental biology. The pharmaceutical companies would take the view that almost any basic research in fundamental biology will sooner or later be valuable to them in an applied sense. What seems to be happening now with the introduction of strategic basic, strategic applied and applied strategic and so on is reminiscent of Hamlet in a sense—I mean, we are into tragical, historical, comical, and comical, historical, tragical and all the rest of it. Do you see any value in actually playing with these categories? Perhaps you would accept basic, strategic and applied as Dainton defined them. Why can you not leave it at that?

(*Professor Sibson*) My Lord Chairman, what we have tried to do is to think about the implications for that categorisation of external constraints, particularly the one to which I keep referring of subsidiarity. But I accept what Lord Phillips says. It may be that we need to seek the further services of Professor Martin Harris, the Vice-Chancellor of the University of Manchester, whose recent clarification of typology to degree titles might then perhaps take us back to a clearer typology for different sorts of research. But certainly the intention of our submission was, as I have said, to keep the door as open as possible for basic research within the Framework Programme subject to those constraints.

Chairman] We must now move on to joint research centres and attribution, two subjects which we wish to seek your advice on.

Lord Gregson

397. My Lord Chairman, many years ago I had the fortunate experience to work at ISPRA, having been sent there by the British Government to help them out of extreme difficulty, and therefore I have a slightly jaundiced point of view on this. My first question is very simple. Do you really think that a change of management would make very much difference? Even if you have the best management in the world you cannot really manage an institution that is based on the wrong premise, can you? In my day it was "my turn next, please"—shuffle a pack of cards and distribute them round the Common Market country by country in effect—and that really is the basis on which they were established. Is there any real future for them?

(*Professor Husband*) My Lord Chairman, let me try to answer that. Without being overly critical of them, let me say that I am very dubious about the long term value of the Joint Research Council to Europe mainly because if one looks at the funding of the Joint Research Council which, as you know, had its origins in nuclear energy, the extent to which the JRC depends on European Union funding without it being competitive has hardly changed in the last five or ten years. It was projected to come down to something like 50 per cent by 2000 and it is quite clear that it is never going to come anywhere near that. It is in the high 70s at the present moment. Therefore, your point about, it doesn't matter how good the management is, I am afraid does ring true with me personally and I think with the Committee of Vice-Chancellors and Principals. There could be a case, in fact, there certainly is a case, for insisting that the Joint Research Council is given no monies other than monies that it wins in open competition with other research organisations around the Member States, but I do not think that you could close it immediately. I think that it would have to be phased out and maybe networked with some of the other existing organisations. It is difficult it seems to us to see a good economic or even a good scientific case for the Joint Research Centre to continue.

398. The present justification from the Commission is this question that they want a body to refer to for their policy statements. This, of course, was well thrashed out when the defence research establishments were justified by the Minister of Defence which I find very curious because the biggest defence programme in the world, which is the American programme, the biggest research programme in the world, in fact, by a factor of 15, does not have this service. They go to the universities and they go to the academies. The Academy of Engineering has a standing committee which is in effect to advise government. Is it really a justification therefore to suggest that some rather tired, worn out, flogged out institutions will provide a basis of advice to the Commission?

(*Professor Husband*) My Lord Chairman, that may be a bit extreme . . . ! But, if we were to start today and set up a Joint Research Centre or Joint Research Centres I suspect that we would balk at it and not do it. It is something that is straight history from Euratom.

Lord Butterworth

399. What is the view of the Committee of Vice-Chancellors and Principals of the Treasury policy of attribution?

(*Professor Husband*) My Lord Chairman, we had problems with this because we are not 100 per cent clear that we know the Treasury view on attribution—but, we can try. I think it was me who said I will try to respond to this. Clearly I think attribution is very important to a government department and the extent to which a given government department would want to input its own monies into a European programme. By the time that that impacts on a given university and further by the time that that impacts on a given academic who is going to make a contribution or a submission for funded research, I think that the influence is so indirect as to be not obvious to the individual at the research bench or at the computer screen. We are not aware of it having any great influence on the bidding behaviour of academics, but it clearly must be at the level of government departments. It must also alter the shape of programmes, my Lord Chairman, but it

Lord Butterworth *contd.*]

is not clear to us when it gets to the university level—that is the reason.

400. What you are saying then, Professor Husband, is that it is not important in the formulation of university policy?

(*Professor Husband*) No.

401. But it must exert an influence upon the departments?

(*Professor Husband*) Absolutely, my Lord Chairman, yes.

402. And presumably especially at the moment of the formation of Framework policy?

(*Professor Husband*) Yes, I suppose that it must do, yes, it absolutely must do. I really am not trying to avoid the question, my Lord Chairman—there may be no way of answering this—but certainly the universities are not directly involved with the Treasury, for example, or with the department as to their view about attribution on a given research programme. By the time it impacts on us, therefore, it is after the fact, it has been done.

403. I suppose because the whole process takes two years, the correction occurs in the second year, and it is not the university as such or the applicant or such who suffers?

(*Professor Husband*) That is right—well, I think that that is right.

Lord Butterworth] Thank you very much.

Chairman] I am afraid that we have run out of time. We have kept you for a long time and we are most grateful to you for the help that you have given us. Thank you very much indeed.

Supplementary Memorandum by the Committee of Vice-Chancellors and Principals (CVCP)

EXAMPLES OF UK UNIVERSITY PROJECTS FUNDED BY THE EU FRAMEWORK PROGRAMMES

1. EXAMPLES OF WHERE PARTICIPATION IN THE FRAMEWORK PROGRAMMES HAS HELPED TO STRENGTHEN THE RESEARCH CARRIED OUT IN EUROPE

King's College London—Mediterranean Desertification and Land Use (MEDALUS)

King's Geography Department co-ordinates this multi-partner study under the EU Environment and Climate Programme. Started in 1991, MEDALUS is in its third phase and involves 44 participants—9 from the UK and the others from Italy, France, Greece, Portugal, Spain and Belgium. MEDALUS focuses on land degradation and evaluation of the best future uses of land. One aim is to persuade politicians to consider longer term remedial action.

MEDALUS has resulted in the following.

- Hosting research fellows under the Human Capital and Mobility Programme and its successor, the TMR programme.
- Numerous papers in scientific journals.
- A *Field Manual* on the experimental design and methodologies which has been supplied to EC-funded research programmes for use in other Mediterranean sites.
- A book *Mediterranean Desertification and Land Use.*
- A MEDALUS CD-ROM database.
- An *Atlas of Desertification.*

University of Central Lancashire-Euro screen project

Euro screen, funded under BIOMED II of FPIV, examines the ethics of genetic screening. It involves 29 participants from 14 countries, representing academia, medicine, the pharmaceutical industry and patient groups. The research is multi-disciplinary covering philosophy, law, history, anthropology, genetics and sociology. The results of the first three years of the project are to be published in January 1997.

The House of Commons select committee on science and technology recently completed its own report into human genetics. It is a difficult and complex area. Topics such as the commercialisation of genetics and the use of genetic tests in health insurance are among those which Euroscreen will address over the next three years. A "Gene Shop" will be developed to provide public access to information and advice about genetic testing and diseases.

Euroscreen has strengthened basic research into the ethics of genetic screening by producing an ethical framework by which to assess various facets of genetic screening (for example, childhood testing). The research allowed comparisons between different European health care systems. Certain aspects of this framework would be very different if the research has not been of an international nature. For example, the concept of "solidarity", which is very strong in countries such as Denmark, is less familiar to British ethical thinking about these issues.

University of Hull

(a) Aircraft Interior Noise project

Funded under the Brite-Euram (Industrial Materials and Technologies) programme this research involved universities and four research organisations across Belgium (coordinator), UK, Italy, France, Sweden, Ireland, Greece and the Netherlands.

In addition to the technical deliverables all being met, other spin-offs include building up a large network of contacts in related disciplines and a strong commitment from the partners to continue collaboration in the future.

High quality researchers were involved and there was wide diversity in the disciplines represented in the project consortium. It is unlikely that any of the partners would have had the motivation or breadth of knowledge to produce the same result if it had not been done under an EU programme. The project was principally of academic interest to the UK. No patents have been filed as yet, though several publications have been made.

(b) Surface Engineering

This project, funded under the Brite-Euram (Industrial Materials and Technologies) programme involves six partners—two academic, one research organisation and three industrial across the UK (Hull coordinator), Germany, Italy and Sweden.

Technical progress has already been made within the first 11 months of the project. Although this is not a basic research project, a clear output to date has been the identification of lack of knowledge in certain areas, which needs to be addressed in order to advance the subject.

University of Edinburgh

(a) The European Network in Language and Speech (ELSNET)

ELSNET was established by the University of Edinburgh five years ago under the ESPRIT Basic Research Programme. It is an outstanding example of an initiative which could not have happened without EU Funding. At the time of its inception, there was a big gulf between the research communities responsible for natural language processing on the one hand, and speech processing on the other, to the detriment of both. Moreover, European R & D in these areas was too dispersed to capitalise on the highly qualified pool of language and speech engineers in Europe. This was regrettable given the European need for computational tools to support multilingual communication.

ELSNET contributed to a sea-change in this area. The integration of language and speech research is now comparable to (and in some cases surpasses) the level achieved by our competitor countries (America and Japan). The creation of a European community of qualified language and speech personnel and the increase in visibility for European language and speech research contributed to the establishment of a new Telematics Programme in FPIII in Linguistic Research and Engineering. This was extended further in Framework IV. Of particular importance was the formulation of an evaluation-led research methodology which allowed for more structured organisation of research across Europe.

In the UK, where industrial research in language and speech had virtually come to a standstill by the early '90s, there is now again a healthy language industry, with natural language and speech engineers being employed by established Fortune 500 companies as well as brand-new SMEs.

(b) EU Funding for EPCC—Impacts and Benefits

In 1990 the University of Edinburgh founded EPCC as the focus for the application of High Performance Computing (HPC) to real industrial problems and academic research—a field in which it had been a leader since 1982. By 1992, EPCC was a thriving technology transfer centre with some 35 staff, a growing range of HPC facilities, and an impressive client list of UK companies form blue-chip multinationals to local SMEs. However in global terms, EPCC had little visibility. Against this background a bid was made called TRACS (Training and Research on Advanced Computing Systems) to become a European Large Scale Facility (LSF) under the Human Capital and Mobility (HCM) programme. Edinburgh was granted 1.5 MECU over the three years—approximately double the average award.

TRACS started in March 1993 with the aim of encouraging pan-European links between researchers wishing to use the latest generation HPC systems. The plan was to generate a summer school atmosphere all year long and over the next three year TRACS grew to become a very successful computing-related LSF.

During the three years, TRACS took 144 visitors staying for 299 months from every EU and EEA country (barring Iceland and Luxembourg). A further eight visitors came from Central and Eastern Europe. They were hosted in 26 different departments in six universities and research institutes in central Scotland. The physical sciences and engineering are traditional disciplines for computer simulation, but the visitors' interests extended over a much wider range: from geography to particle physics, from chemical physics to music. The TRACS has produced around 87 scientific papers and conference proceedings; more are expected.

Following the success of TRACS, Edinburgh applied for an extension of the programme, called TRACS96, to the Training and Mobility of Researchers (TMR) programme. This attracted 1.4 MECU over three years; again about twice the norm. In addition, Edinburgh has been unanimously supported by HPC Centres, Data Centres, and key user-groups across Europe to be the lead partner in TMR Concerted Action proposal which would co-ordinate European HPC and data activities.

EPCC applied to become a Technology Transfer Node (TTN) with a bid called ENTICE (European New Technology for Industrial and Commercial End-users). It was granted 800k ECU over two years, becoming the UK's first TTN. The projects span business process optimisation to medical imaging and the large majority of industrial partners are SMEs.

In the last four years Edinburgh has attracted over four MECU to EPCC through TRACS/TRACS96, ENTICE and Esprit projects; become the UK's national centre for HPC services to UK researchers; moved to a position of international pre-eminence rivalling the largest of the US supercomputer centres. There are 26 TRACS host departments which have seen new research ideas and collaborations; 20 companies in the ENTICE and Esprit projects which have benefited from joint research and development effort to improve their products and services; and the UK computational science base has also benefitted.

University of Durham—the BRIDGE and AIR–CAP Projects

BRIDGE and AIR–CAP are plant molecular biology projects. Each has provided funding for the establishment in Europe of *Arabidopsis* as a powerful model plant species for molecular biological and genetic studies. This promotion of *Arabidopsis* molecular biology has allowed basic plant research in Europe to compete successfully with that of the United States and most other parts of the world. The work formed the basis of a major genome sequencing initiative, currently in progress and funded to a large extent by EC, in a programme that it is truly trans-national and impossible for any one country to carry out. The projects facilitated the exchange of ideas, skills and materials between collaborating laboratories. They have also led to new funding opportunities for the university from UK Research Councils, UK industry and from EC FPIV. Several research publications have emerged. Technology transfer has been, and is being, developed and is being picked up by agrochemical industries throughout Europe. This will make a significant contribution to crop quality and therefore quality of life.

University of Wales, Cardiff—European Olives Project

This was a £5 million research contract for the development of an environmentally safe pest control for European olives. It involved several commercial companies and 65 scientists. The School of Pure and Applied Biology ran the project, co-ordinating the work of 11 participating organisations, ranging from government research laboratories and commercial firms to oil producing co-operatives in Spain, Greece and Italy. These countries between them produce 64 per cent of the world's olive oil and 50 per cent of eating olives. Because the crop is attacked by several insect pests, £55 million a year is spent on pesticides. The objective of the research is to reduce pesticide use in the olive oil crop, to develop new and environmentally safe methods of pest control and to link these together into an integrated pest management system. The leading industrial partner in the project was AgriSense BCS Ltd, a company established as a spin-off from University research. The project has reached a successful conclusion. Additional funds have been made available to develop an information booklet for olive oil farmers in the southern Mediterranean regions.

2. EXAMPLES OF WHERE THE FRAMEWORK PROGRAMMES HAVE LED TO A BETTER DISTRIBUTION OF SCIENTIFIC SKILLS

King's College London—Esprit Network of Excellence in Neural Networks (NEuroNET)

The long-term goal of NEuroNet is to develop neural network technology for applications requiring complex pattern processing and decision-making capabilities. More specific goals include: heightening the industrial awareness of neural network research activity; reducing the application of research effort via increased contact between groups; and increasing the applications of neural networks by industry to solve difficult problems. A reason for setting up NEuroNet was to provide support for workshops, summer schools, research visits and exchanges particularly for young researchers. A recent example involved funding 18 students to attend a major conference in Artificial Neural Networks in Bochum at which NEuroNet had a stand. The network consists of 14 nodes, including ERA Technology Ltd and Siemens (Munich). In addition to meetings, contact is maintained between partners via NEuroNews, a regular newsletter, email, and the NEuroNet home page on the Internet.

University of Hull—solubilication and interfacial properties of surfactant solutions project

This project, funded under the Human Capital and Mobility Programme, involved seven partners: five academic, one research organisation and one public sector agency across France (co-ordinator), Germany, Austria, Portugal and UK. The main benefit was the involvement of students from different disciplines. Basically a Chemistry project, the investigator recruited non-chemists to the project. This was stimulating and broadened the skills and knowledge of those involved in the project. No patents arose from this project, but there were a significant number of publications (approx 18).

University of Durham—Synthetic Electoactive Organic Architectures project

There are nine participants in the network: seven universities and two national centres across the UK (Cambridge and Durham), Netherlands, Portugal, Sweden, Germany, Belgium and France.

The research network brings together three areas of basic science:

- control of processing of polymers and oligomers to produce well-ordered structures at the molecular level, which can display novel topologies,
- development of new synthetic methodologies giving access to well-defined molecular and supramolecular structures, and
- development of the understanding of the electronic and optical properties of materials of this type which contain conjugated sequences.

This provides a cross-disciplinary branch of science which has already generated novel discoveries of technological significance in the demonstration of polymer or oligomer-based devices such as thin-film transistors and light-emitting diodes. Several laboratories which are part of this project have been at the forefront of this novel branch of science which is presently attracting the interest of a larger number of scientists worldwide. The network began this year and is already producing good work.

University of Wales, Cardiff—Large Scale Facility for combustion

Cardiff's School of Engineering was awarded a grant under the Large Scale Facilities component of the Human Capital and Mobility Programme to enhance their combustion facilities. This resulted in bringing to the School scientists from all parts of the European Union. Additional funds have been made available to enable scientists from Central and also Eastern Europe to access the facilities. This has given the scientists access to state of the art facilities and enabled Cardiff to enhance its links with potential European partners.

3. Examples of Where the Framework Programmes Have Encouraged Industrial Development and the Application of Technology

King's College London

ARTEMIS—Advanced Research on Transmission and Enhanced Multi-gigabit Interconnection by Solitons

MIDAS—Multi-gigabit Interconnection using Dispersion Compensation and Advanced Soliton Techniques

ARTEMIS and MIDAS address the infrastructure which is necessary to support increased levels of communication in society today. As the level of information which can be transmitted increases, the demand for more capacity increases. The changing patterns of work are leading to more distributed working environments which place increased pressure on demands for higher bandwidths to the office and home. Future European broadband networks are likely to require multi-gigabit (100) links over large distances to facilitate communication demands. ARTEMIS and its successor MIDAS are aimed at demonstrating high bit rate transmission over currently installed lines. Upgrading current networks is likely to yield considerable economic benefit.

ARTEMIS is co-ordinated by the Division of Engineering at King's and comprises six other partners, three of which are telecommunications companies. EU funding is 2.56 million ECU. MIDAS has seven partners, including two industrial participants, and has a project value of 2.7 million ECU.

University of Hull—Surface Engineering: Resource conserving coatings in manufacturing of non-ferrous metals

This project, supported under the CRAFT Programme (now Technology Stimulation Measures for SMEs), involves three research partners (including the University of Hull) and nine SMEs (small and medium sized enterprises) across the UK, Germany, France, Denmark.

The project was led by perceived industrial demand, with the universities and research organisations involved performing research on behalf of the participating small companies. The results of the project were very helpful to the companies and have contributed to the competitiveness and promoted industrial development.

Glasgow Caledonian University—Intelligent Supply and Control of External Lighting systems (ISCELIS)

Glasgow Caledonian University and Oviedo University (Spain), have been awarded a major £700K grant to develop an external intelligent lighting system. This system will supply, control, manage and maintain an external lighting network targeted to achieve:

- energy saving
- high reduction of maintainence costs
- improvement of lighting service quality
- enhanced safety for people and premises
- more effective supervision.

The project is being partially funded for two years under the CRAFT section of the Brite-EuRam programme, which is concerned with involving small companies (SMEs) in collaborative research. There are seven companies involved in this project from Scotland, Northern Ireland, Germany, Spain and Portugal.

The results of the project will permit product innovations and new market opportunities for each of the sections, as well as the possibility of commercialising, via the consortium, a high performance and high added product, at low cost. The award of the grant has encouraged the University to establish an Intelligent Technology Research Centre.

4. Examples of Where the Framework Programme Have Contributed to Competitiveness and/or Improved Quality of Life for the EU's Citizens

King's College London—Molecular events influencing cellular behaviour in an established model of atherosclerosis

Atherosclerosis causes heart attacks, strokes and the conditions of cerebral disability, vascular dementia, ischaemic heart disease and peripheral vascular disease at a huge cost to health care in Europe. It tends to occur in middle to late life and the cost is therefore even greater because it removes trained workers from the workplace.

This project led by King's involved academics in Finland, Germany and Italy. The combined work of the partners on animal models has found that vascular smooth muscle cells (VSMC) may play a central role in atherosclerosis. The project was initally funded in BIOMED 1 as a concerted action. A further project in BIOMED 2 which looks at the mechanisms involved in VSMC proliferation in more detail is now under way. A fuller understanding of the mechanisms would allow either chemical or gene therapy intervention to inhibit the process. A patent has recently been taken out by the group to this end. Development of treatments could potentially earn the European drug industry approximately 2 billion ECU per year.

Examination of Witness

Sir William Stewart, FRS, FRSE, was called in and examined.

Chairman

404. Sir William, may I welcome you back to the Select Committee.

(*Sir William Stewart*) My Lord Chairman, thank you. I sit here rather naked in that I am not surrounded by people who can help me out of difficulty so I hope very much that I am among friends! Let me make a few points, my Lord Chairman. First of all, I believe that during the course of the next century science and engineering and technology are going to be crucially important and that anything that your Lordships in this Committee can do from your position of eminence to promote sensible investment in science in the United Kingdom and in Europe generally is terribly important. So I welcome the enquiry that you are carrying out. Secondly, we in the United Kingdom are full members of the European Union so our role is not about standing on the sidelines; our role is to influence positively national Government, the Commission, the European Parliament, so that the best science in Britain and Europe gets funded and through that I hope that our national prosperity and quality of life will benefit. Thirdly, my Lord Chairman, I see no prospect of the Framework

Chairman *contd.*]

Programme being disbanded, because there is no demand for that from any of the Member States and there is no consensus about what the better alternative might be. Fourthly, as a scientist, national and international collaboration and competition comes naturally. We collaborate not only in Europe but we collaborate globally, and as a country that does 5 per cent of the world's research with 1 per cent of the world's population we have to build these international alliances with the best right across the world. In some cases that will be Europe; in many cases it will be elsewhere across the world. So I come here as somebody who wants to influence the Framework Programme positively. Finally, I am aware that anything that I say today could be read eventually in Europe and equally I am aware that anything that you say will eventually be read in Europe.

405. Thank you, Sir William. What I think we would like to do is to ask you with your great experience how you think the Framework Programme, particularly the Fifth Framework Programme, might benefit from the experience of previous Framework Programmes. May I pick up on the observation you just made that there appears to be no prospect of disbanding the Framework Programme simply because all Member States and everyone who has given evidence to us suggests that the Framework Programme should indeed continue. Nevertheless we have to ask the fundamental question, doers it provide good value for money?

A. My Lord Chairman, the Framework Programme IV in 1995 spent about £345 million of UK money, that is 15 per cent of the programme. EPSRC spent about £370 million on its own programme. It is difficult to make direct comparisons, is it not, because EPSRC funds mostly basic and strategic research. I think that at present about 50 to 60 per cent of the funding of EPSRC is in areas which were identified by Technology Foresight and which EPSRC were actually doing already. There is about 10 per cent more as a result of new initiatives allied to Technology Foresight and then there is 40 per cent which is blue skies research. Framework Programme IV targets research which is more associated with industrial needs and with the needs of European policy. Importantly, Framework Programmes IV and V should only be funded if what is done is additive, not similar to what is done nationally. That distribution between what is done in the United Kingdom and what is done in Europe, with the basic in the UK and the more applied in Europe, is a sensible thing. It is terribly important for the UK scientific community because the research councils are only attributed with about 14.5 per cent of the total UK contribution. As soon as we start saying that more basic research should be done in Europe the first thing that is going to happen is that the research councils will be attributed to pay for it. This division with funding of the more basic by the United Kingdom and the move towards funding the industrial sector via the Framework Programme is a good mix. In relation to value for money, my Lord Chairman, like beauty, value for money is in the eye of the beholder. What the academic says is value for money is not necessarily what the industrialist says. I read last night a quote from the Union of Industrial and Employers' Confederations of Europe which said, "Tomorrow's applied research must be fuelled by today's basic research." I do not think that that totally captures—that is the linear model that Lord Phillips does not like—nevertheless, the two components are there. In terms of value for money SPRU has, I think, provided compelling evidence that basic research in the United Kingdom at least is important. It enhances productivity, it addresses societal needs, for example, in the pharmaceutical industries. When you come to get value for money from the Framework Programme, of course it is much more anecdotal. We do not have the same level of analysis of what the outcomes have actually been. It is fair to say that I see researchers winning grants in the Framework Programme who would not stand a chance in the peer review system in the United Kingdom. Secondly, I would say that the European Union management of the Framework Programme leaves a lot to be desired. Thirdly, and perhaps more important to me, my Lord Chairman, I see the centralist approach which has been adopted and extended to be at variance with global trends. If you look at what is going on across the world, you can see even in the United States the outsourcing that is going on—from the federal to the state; the best global companies are outsourcing, they are not doing everything in-house themselves any more; then the moves within the United Kingdom for broad strategic issues to be considered at the centre and for the management of these to be done by outsourcing to the research councils, the higher education councils, etcetera. The central monolithic structure that we have had in the former Soviet Union shows you how this concentration at the centre is not necessarily the way forward. So I wonder sometimes, my Lord Chairman, whether the EU is a bit anachronistic in some of the things that go on within the Framework Programme.

Lord Nathan

406. Sir William, you touched upon a question which concerns me a good deal, and that is the question of assessment and evaluation of the outcomes of the work done under the previous Programmes. When we asked other witnesses whether they could help us on that, for instance, with regard to Framework Programme IV, the answer was, it is too early. Are we embarking upon Framework Programme V without any idea as to whether the Programme as a whole has done any good or not and whether it is going to be useful or not without any assistance from the evaluation of any past Programme?

A. As a scientist, my Lord Chairman, I would say that it is difficult in the short term to fully evaluate whether the science that has been done is good value for money; and secondly, it is a fact that the previous Framework Programmes have not been evaluated in the way that they would sensibly have been evaluated had they been national programmes. The problem we have is that the same level of detail of the success or otherwise, the evaluation of the programme, that goes on in the United Kingdom has not been carried

Lord Nathan *contd.*]

out within Europe. That is indeed a worry. I could elaborate. For example, if the Framework Programme was a UK programme you would be asking for a better peer review system, you would be asking whether the management was as efficient as possible and, if the management was not efficient in the United Kingdom, they would not be giving us any more money. They would say, "You need to improve your efficiency". Yet, in Europe, the Framework Programme keeps going up and these sorts of analyses of the outcomes from it have not been done. I agree with you that there is a problem. It might not be possible to evaluate the efficiency of how successful the science has been and its interaction with industry—I personally think that it might well be very successful. On the other hand it is possible at this stage to analyse and measure the efficiency of the management of the Programme. I do not think that we have that. It is one of the things that we should be asking the European Union to do. We need an independent assessment of what research has been done, and which are the journals that it has been published in. What is the management efficiency, and how does it compare with the best research councils in the United Kingdom, in the American system and elsewhere. That is a sort of global analysis that has to be done. It is very easy to say, well, we will do an analysis of how the Joint Research Centre has done, and then you get a few chaps from within Europe somewhere who go and do an analysis and say, "It is splendid", but you have really got to examine it in an international context, and that has not been done.

Lord Gregson

407. If you consider that Framework Programmes are virtually based on the Frascati definition of applied research and not basic research therefore you would expect results in a shorter period of time to show, in effect. I was involved with Framework Programme I in some considerable way and, quite frankly, I do not remember a single research programme that I would classify as alpha one under any circumstances. What is your experience, Sir William? Framework Programme I is now dead, you know, it has been completed. Can you think of anything that came out of Framework Programme I that would hit the headlines in even the smallest technical journal?

A. The answer quite quickly and simply is, no.

Lord Gregson

408. Why? Is it a research programme or is it a social security programme or is it an educational programme really?

A. I do not know, I cannot answer that.

Baroness Platt of Writtle

409. Just to follow that on, my Lord Chairman, several people have said in defending Framework Programme V, well, it is producing results. The only thing we have heard is the yeast genome, but we have not heard of anything else. Going across the whole lot, where are the results, because several have said to us, "We need to spend more money because we are not spending enough", but none of them seemed to say, "And look at all these exploitable things they have found out".

A. My Lord Chairman, I am interested in the fact that Lady Platt should choose the yeast genome because I am not totally convinced that that need be a uniquely European programme.

Lord Gregson] Hear, hear.

Lord Phillips of Ellesmere] It was not.

Baroness Platt of Writtle

410. But are there any other things? That is the only thing that has been quoted—I think I am right, my Lord Chairman—and I am not by any means disagreeing with you.

A. I do not know the details and I would not be expected to know the details, but I am sure that if you get increased collaboration between good minds thinking about common problems, then there must be a knock on positive effect. That is one of the most effective aspects of the Programme. The Framework Programme V is with us and we must try, my Lord Chairman, to shape it, manage it and make it better.

411. My Lord Chairman, that perhaps leads on to the question of the regional nature of Europe. Are the programmes considering too much the importance of social cohesion and the regional nature and perhaps therefore reducing the quality?

A. I think that social cohesion has been used to justify mediocrity and unless we get away from scientific and intellectual mediocrity, then I think that the Framework Programme will not be as effective as it should be. There are various ways in which one can achieve effective cohesion. One could say that you must get cohesion—and I agree about cohesion, but you must get cohesion by ensuring that those groups who are not up to the standards of the best laboratories come to the best laboratories. I actually believe that the Human Capital and Mobility Programme, if used in support of excellence in centres of excellence could be very helpful, but too often at present cohesion is used as an excuse for mediocrity.

Lord Butterworth

412. Sir William, I think that you were in the room when we talked to the Committee of Vice-Chancellors and Principals about attribution and their response was that while it might be important it did not actually affect universities or applicants as such, but they suspected that it might have a considerable effect upon the formulation of policy in departments.

A. Within government departments?

413. Yes?

A. In relation to the attribution system, yes, I believe that it does have an effect. I have several points about attribution, my Lord Chairman. First of all, I find it difficult to argue that attribution is a good financial discipline which we should follow when we are using that financial discipline at the behest of Treasury in the United Kingdom, but it is

Lord Butterworth *contd.*]

not being applied to the same extent in Europe. Secondly, the Framework Programme has to be paid for somehow and it is difficult to convince me at least, that the main function of attribution is to instil discipline. I believe that its main function is to cream off funds from the budgets of departments which support science for use in support of European policy. Thirdly, there is little doubt that the research councils get off rather lightly, and they get off rather lightly because they do more fundamental work, if you like, yet the universities actually get 50 per cent of the funds of the Framework Programme. This is a good thing. But I would be surprised if departments did not try to push some of the attribution on to the research councils. Some departmental chief scientists rise above it and they say, "Look, why don't we be constructive about this, why don't we take the view, for example, that there are areas which the United Kingdom should not be involved in funding at the national level and get that funded via the European route". That seems quite sensible. But there is little doubt that attribution is a problem, that the research councils are largely protected because of the current nature of the Framework Programme and that it is not surprising if departments wish to be attributed less and have more control over their money.

414. You are saying then that when attribution occurs, as it were, in the second year it is the departments that suffer the burden and it is not passed on fully to the research councils?

A. It is the departments which mainly fund the type of work that goes on in the Framework Programme. The complication, of course, is that 50 per cent of the attribution goes to the Department of Trade and Industry, and the Department of Trade and Industry is the owner of the Office of Science and Technology at the present time.

415. Sir William, I understood at one point that you were saying that the effect of attribution when it occurs is to replace our priorities by Framework or European priorities?

A. There is a whole range of science and technology work which needs to be carried out and there has certainly been debate about whether we need to try to cover all of these areas at home or whether we should say, "Well, let us focus on some using the domestic budget and let some the other areas be funded under the Framework Programme.

Lord Phillips of Ellesmere

416. To come back to attribution, Sir William, it is my recollection—and I recognise that memory is fallible—that in a previous incarnation when funds were attributed certainly to the DES and I think the Office of Science and Technology as a result of the United Kingdom's contribution to the Framework Programme the minister responsible at least during my time, and it overlaps a great deal with your time, always made good that attribution in the research council and funding council budgets so that the research councils and funding councils never felt directly the effect of attribution whereas, as you say, with the Department of Trade and Industry and other government departments there was a profound effect on the budgets that they were able to deploy on science and technology related activities. In your recollection is that a fair statement about what happened?

A. That is exactly what happened. Basically the ministers can decide what they do with their own budgets; but, secondly, the ministers can also go to the Treasury and fight for funds for attribution at any time. They can certainly bring attributon into play when they are fighting for their budget during the PES round.

Lord Craig of Radley

417. My Lord Chairman, may we turn now to a management issue in the Framework Programme. We have had evidence that there is a lack of delegation of signatory powers within the European Commission which is an impediment to the management of Framework Programmes. I would be very grateful for your assessment and remarks on that.

A. It seems to me, my Lord Chairman, that the current system is overloaded and over-managed. As I understand it, every contract has to be approved by every line manager up to the Commissioner himself and that wastes an enormous amount of time. I am one of those who believe that you should trust the scientist, you should learn to delegate and that the onus to deliver must be on those who actually get the funds and have to do something with them, not with the managers within the centre.

418. I think that we face that problem within our own Whitehall machine.

A. Well, you probably know more of the Ministry of Defence than I do.

Lord Soulsby of Swaffham Prior

419. Sir William, bearing in mind what you said at the outset, that what you say and what we say will be read in the European Union, over the weeks that we have received evidence there have been several criticisms of the smoothness of running the Framework Programmes—they are slow, which you mentioned, the lack of transparency, etcetera. What problems do you perceive in intra- and inter-Directorate-General communication in the European Commission and what suggestions do you have to improve that communication?

A. Basically, in any fiefdom, whether it is within the Whitehall system where you have departments fighting their own corner or whether it is in Europe where you have got Directors-General fighting their own patch, communication is not always the natural way forward. That is a fact of life. What the United Kingdom has done about science for better or for worse—for better, I would hope—is that we have had a look at the whole situation. We have come forward with a White Paper and we have generated a way forward for the United Kingdom. In a sense, what the United Kingdom has done about the science is a pilot which could be looked at sensibly by the European Union. We have a Chief Scientific Adviser and an Office of Science and Technology looking across the whole of Whitehall. Does that occur within Europe? The answer is, no, it does not, so we

Lord Soulsby of Swaffham Prior *contd.*]

do not get the cohesion at the scientific level that we could benefit from.

Chairman

420. Sir William, I was surprised, because I came from a position of ignorance, to find that there is one Director-General for the Framework Programme and another Director-General for the Joint Research Centre. Does that seem a logical division of responsibilities?

A. My Lord Chairman, I am not absolutely sure whether that is so.

Chairman] It changed in January, we are told. It is news to me and apparently it is news to you as well, Sir William, so I have been able to impart some information to you!

Lord Haskel

421. My Lord Chairman, that raises the question as to whether the Joint Research Centre is in fact necessary. We spoke about science being international and the need for international alliances and co-operation. Could that not act instead of the Joint Research Centre?

A. This might be a long answer, my Lord Chairman, but let me try to sort it out from the beginning, at least in my own mind. The pace of scientific and technological change is escalating and there is a need for core competence coupled with flexibility; there is a need for researchers to be nimble on their feet because science is going in lots of different directions. Research institutes in general, large research institutes, have difficulty in providing the nimbleness, if you like. You can see a little of that perhaps even within the United Kingdom. You certainly see it in Europe where it is compounded by overloaded bureaucracy and political pressures to have centres across different Member States. The fact that the institutes are very much dependent on the European Union for funding and the Director-General, of course, works very closely with the European Union brings problems. I wonder whether the concept is outmoded. It is certainly not happening in the private sector. My Lord Chairman, let me turn it round and say: my thesis is that the Joint Research Centre is not a suitable model for the next century. I believe that the best place for research to be carried out is the universities because there you have got a rechargeable supply of the best brains, you get training in the newest techniques and technology, you have innovative minds and you have flexibility. Indeed, when Lord Selborne and I were in the AFRC we had a shift away from institutes towards universities. I believe that the only way that some institutes, particularly in Europe, are able to compete is that their parent sponsors ensure that they are provided with outstanding research facilities and equipment. If that level of equipment and facilities were to be provided to the best universities in this country and, indeed, in Europe, then that would be a beneficial way forward. That is point number one. Secondly, my Lord Chairman, I question why the Commission does not make more use of existing institutes in member countries. Thirdly, I would accept that there is a need for European centres of excellence, especially where special facilities are needed which cannot be provided by any Member State. Let us take some examples. I do not actually see why the European Union needs its own environmental institute at Ispra. I do not see why it needs an Institute for Prospective Technological Studies in Seville or, indeed, its own Institute of Advanced Materials. I am not wholly convinced that it needs its own Institute for Reference Materials and Measurements in Belgium, but I can be convinced that it needs European facilities for fusion research, because that is the sort of area where none of the establishments in the Member States can do it alone. So, if I was over there in Brussels, I would be doing several things. I would be putting a cap on Joint Research Centre expansion. That is the first thing. Secondly, I would say that the Joint Research Centre should be funded on a competitive basis. Thirdly, it should be peer reviewed by really independent visiting groups. Fourthly, there should be an independent study which compared the outputs in terms of scientific advances as measured by research papers in quality journals and patents taken out, with the outputs from national laboratories in the Member States and federal laboratories of the United States. In that way you would get a better assessment of what the Joint Research Centre has achieved and whether it has anywhere to go in the future. Perhaps your Lordships should follow Lord Gregson and visit Ispra.

Lord Gregson

422. You probably know that other countries have criticised the all-embracing nature of some of the research programmes where relatively small and poorer countries have been brought into the system. There has been a suggestion that there really ought to be a two-tier system for good science, the first or top tier obviously for the major countries, and the second tier for the minor countries. Would you like to comment on that?

A. It is quite a difficult issue, is it not. First of all if you had a two-tier system the research would mainly involve the larger Member States. Lots of collaboration already goes on between the advanced countries. There are very few examples where the European Union is involved. Second, what would the smaller countries actually say about this. I get back to my point that the larger countries could interact more closely if in fact we could ensure that what is based on excellence rather than on the needs for cohesion. Should we be dictating from the top that the Russell group should be selectively funded by the higher education funding council? We know at present that through the normal peer review system based on excellence something like 70 per cent of the research funds already go there. If you could get that sort of analysis brought into Europe, then there would not be the need for a special mechanism to deliver the sort of thing that you are talking about. I would complement that, as I say, by ensuring that researchers from the less developed centres and less developed countries get the chance to operate within

Lord Gregson *contd.*]

these centres of excellence in the more advanced countries.

423. Should it be a charge on the research funds to encourage cohesion or should it be a separate programme or a separately funded programme? Does it not distort the whole question of the research?

A. My Lord Chairman, I am not convinced that cohesion is good for scientific excellence within Europe.

424. It is written into the original resolution that went to the Council, I think it is the fourth or fifth item, so it has got to be taken account of. Are you saying that is not a good thing?

A. What I am saying is that from a scientific point of view I question it.

Baroness Platt of Writtle

425. Might it perhaps be done a different way, through the Transfer and Mobility, in that you are saying, if a bright young person from one of the less developed countries has the opportunity to go into a laboratory of excellence, then surely one of the best ways of transferring technology is for that person then to go back to their own country taking what they have learnt and maybe putting it into action?

A. That is what I am actually suggesting as a way forward.

Lord Lewis of Newnham

426. I can understand people moving, but very often one of the potentials that come out of this is the SMEs, the small and medium enterprises, who in a small country could learn a lot by being associated in a programme with one in a larger country, so it is not so much an individual; it may actually be an aptitude that you can build into a firm, and I realise that I do not know how far that can be accomplished in fact, but it does seem to me that that is a dimension that is not normally covered in a mobility programme as we see it at the moment.

A. That is a fair point. If one looks at what is going on in the industrial sector among the SMEs and among the large companies they are networking not only across Europe but they are networking across the world, working with the best across the world, so I agree.

427. You referred to the SPRU report for the Treasury which was concerned with publicly funded basic research and how this has had quite a substantial impact on general performance, and I think that the question that was really coming out of that was how far you thought that the United Kingdom Government should be increasing its spending on basic research and perhaps promoting the idea within the Framework Programme. My impression was that you were saying that if they were to increase the amount of basic research it would just get moved back out of the other package, as it were, happening in this country. What I am slightly concerned about in this respect is how far the programme as a whole does exclude basic research. After all, the problem was brought out, I think, by Lady Platt about the genome. This strikes me as being more basic research than applied research and it gets us once again to this interesting question of a definition of basic, strategic (that I think Lord Phillips was bringing out) and applied. How far do you see this as a basic problem?

A. My Lord Chairman, over the years there has been less attention paid to the need for additionality and what you are finding within the European Union now—and the yeast genome is a prime example—is something that is not necessarily providing anything additive to what could have been done by the member countries. On this definition between basic, strategic and applied, I have thought about this a good deal. The new definitions which came out in the 1996 Forward Look, I had nothing at all to do with, because I had gone by then. Secondly, my Lord Chairman, I have never taken definitions very seriously because I believe that definitions are there to be used. When I used to run my own research laboratory, if those funds were for basic research, I made sure that the application that I put in was for basic research; if the funds were for applied research, the proposal would be about applied research. It is impossible, is it not, as we know round this table to clearly seperate what is basic and what is applied research. It is a melange, an interaction between what different people are doing at different times. I think that the whole distinction between basic and applied is falling apart. But I do not think that we should get hung up about it. We should use definitions to our advantage.

Lord Porter of Luddenham

428. My Lord Chairman, the Committee of Vice-Chancellors and Principals and several others that Lady Platt referred to have told us that we should spend more on basic research, that is, in the United Kingdom, and we compare badly with Japan and the United States—those are the two that they mentioned. Is that true? Does the United Kingdom Government spend less than that of Japan on basic research in the universities? That is what we were told by the Committee of Vice-Chancellors and Principals.

A. My Lord Chairman, I do not have the specific details, but just let me try to make three points. As I said before, in the next century science and engineering and technology is going to be more important than it has been hitherto. Secondly, basic research is carried out largely by the universities and, thirdly, if you look at the state of the laboratories within the universities of the United Kingdom at the present time and say, are these world class facilities, the answer is, no. On that basis, one has to argue that more funds should be put into universities for basic research.

429. If instead of "world" you said "Japan" would we not compare rather well with Japan?

A. My own view is that Japanese universities are appallingly equipped.

430. Right, that was my point.

A. But the interaction with industry is so good and positive.

Lord Porter of Luddenham *contd.*]

Lord Gregson] But surely the important thing about Japan, of course, is that most of the basic research is done in the industrial laboratories and not in the university laboratories so you cannot make that comparison, can you?

Lord Porter of Luddenham] The Committee of Vice-Chancellors and Principals would.

Lord Gregson] Oh, you can make the comparison with Japan, but you cannot with the university. Most of the basic research is done in the industrial laboratories.

Chairman

431. Perhaps we should invite Sir William to answer the question!

A. My Lord Chairman, Lord Gregson's point is almost right, but it is not wholly right in the sense that Japanese research is done in universities but it is not Japanese universities. They are looking at the best research laboratories across the world to provide their basic research needs, and that is a sensible way to do things.

Chairman] Sir William, I think that we must finish there. You have given us some very helpful advice. We knew that, with your experience, it would be very helpful and we are most grateful to you. Thank you.

TUESDAY 14 JANUARY 1997

Present:

Butterworth, L.	Nathan, L.
Craig of Radley, L.	Phillips of Ellesmere, L.
Gregson, L.	Platt of Writtle, B.
Haskel, L.	Selborne, E.
Lewis of Newnham, L.	(Chairman)

Examination of witness

Sir Dai Rees, Acting Executive Director, MRC Applied Psychology Unit, was called in and examined.

Chairman

432. Good morning, Sir Dai. We have been looking at the previous Framework Programmes and the proposed fifth Framework Programme; and we would welcome any advice which you can give us as to what alterations or changes might be helpful.

(*Sir Dai Rees*) Thank you, my Lord Chairman.

433. We have crystallised our thoughts, in the sense that we have some concerns—for example, about the Joint Research Centre, the JRC—but we particularly have some concern that many of the people who have given evidence to us appear unwilling to criticise the whole system because clearly we do rather well in this country. We wonder whether this is because they feel that the programmes are, on the whole, well organised; or whether it is a concern more that they do not want to upset the apple cart. What would be your feeling to the national attitude in this country to the Framework Programmes?

A. I think many of us—and I guess ESF is not exempt from this—see ourselves in the position of making the best of the situation as it is. I think it is very perceptive to suggest that people are reluctant to rock the boat or upset the apple cart by making fundamental criticisms which would be difficult for the Commission to do anything about.

434. If you had a blank sheet of paper, where would you start? Would you prefer something a bit looser like EUREKA, which is effectively a gathering together of administrative parties; or would you prefer something which is led from the centre like the Framework Programmes?

A. I think that a lot of the right things are being said in relation to Framework V. The Commission, in the past, has had rather all-encompassing ambitions as to what science it could cover, what role it could play in European science, which I think it has now learnt are not really attainable; so that you hear both the Commissioner herself and the Director General of DG XII often saying: "Look, the Framework Programme is only about 4 per cent of the public sector research spend in Europe, so we have got to find our niche"; and also saying that it is unlikely in the present situation that there is going to be any major increase in budget, "so we will settle for that and make the most of it." Therefore, I do think that is a step towards realism and having decided that, then it is a question of focusing on key themes, where there really is added value. There are some very wise words, by the way, in the POST Report, although it is very gentle in the remarks it makes. There is a great need for transparency of the programme. There is a great need for higher quality input of scientific thinking and scientific evaluation. At the moment, the whole thing is led and run as a kind of administrative exercise. I will make a criticism. No expense is spared to get people to go to Brussels and spend their own time in doing various things; sitting in rooms with each other and conducting Framework business. But somehow, whenever one raises the question of better quality peer review, for example, then the answer is that administratively this is not affordable because of the limits that are placed on 5 or 6 per cent of administrative expenditure by member countries.

435. If the peer review is not being adequately conducted, does that reflect on the quality of the science, or is it more a function of the quality of the financial audit?

A. Of course, if the review is not carried out, then one does not know what the quality of the science is, does one? Most people who are engaged in the process—and I have been engaged in evaluation myself—come out feeling that we have done the best job that we could have done in the circumstances. We have been implicated in the process, and would defend the belief that we have done the best job we could in the circumstances; but that does not mean that we have done the best job that it would have been possible to do.

Lord Gregson

436. When the first Programme was originally set up and the whole thing was being discussed, I was involved at the time. There were two principles that came up very clearly. One was that whatever the research was, it had to be such that it could really only be done on a European basis. That was a laugh, of course, eventually, because nobody believed it at the time and nobody could see anything which was either not international or national. They could not see a European basis for it. Even the nuclear programme, which was the one I was involved in at the time, the European activities were pretty feeble basically. At the same time, the other principle was very clearly defined: cohesion. That was considered more important than the quality of the science. There are many anecdotal stories being told in Brussels: "Please find yourself a lame duck somewhere. Tack it into the programme and that will get rapid

Lord Gregson *contd.*]

acceptance in Europe." What do you think is the real objective of the Framework Programme?

A. I think that there are European issues. It is just that the Commission, in the past, (although I believe the attitudes are changing now), has been so omnivorous that it has not really wanted to restrict itself to things of European interest. In my own area, I would say that the issue of environmental health is something that transcends national bodies and we have a European problem there. I would say also that the question of the evolution of state health care systems is a European phenomenon: these do not occur in many other places in the world, but we have all got ourselves into a bind as to how to run them cost-effectively. We are all conducting in different countries different experiments, different ways of actually approaching this. There would be a lot to be said for putting our heads together, comparing experiences and so on. I daresay that there are other issues. I think there are probably issues in agriculture, for example. There are indeed European problems and issues and I think it would be good to focus more on those. It remains to be seen to what extent Framework V does that. On the question of cohesion, I suppose the thinking here is not unrelated to the role of the Structural Funds. The idea is that we will bring about economic and other convergence; so that given the whole reason for the existence of the European Union, I think cohesion is a reasonable objective for the research programme. However, the way it is done is another matter. I think it is arguable that this has been a disservice to countries like Portugal and Greece who have got so used to handouts from the European Union—not always, let us say, is it the case that the money is looked at all that carefully in areas other than science—so it is well known that governments say to their scientific communities: "We do not need to spend any money on research. If you want to do research go to the European Union." Then, of course, that means that the research which is done is not the research which is top priority for that country necessarily. It might be but only by accident. It is research that is done according to whatever the priorities of the EU are. Given that there is going to be greater focus, I do not know whether it makes sense for Greece to be working on the aeroplane of the future, for example. Then, of course, there is the effect of the brain drain. The Medical Research Council is very grateful to have in biomedical research laboratories throughout this country, a lot of very highly motivated and intelligent research workers from Greece and Spain but it may well be that their own countries need them even more than we do. If the EU is to build up competence in those areas, then we ought to be looking at building the scientific infrastructure and something for those people to return to. The issue is not unlike the problem of the former Soviet Union and elsewhere in Eastern Europe. There is a big general problem here that nobody, it seems to me, is actually tackling.

437. That is a structural problem, not a research problem, is it? A lot of people complain—the Germans complain in particular, of course - that the money is used for structural purposes and is being charged to research. They have been very critical of this. They say: "This research ought to be done by people who are more competent to do it. Do not bother about cohesion. That is somebody else's problem." On the basis of the ground rules for this, it looks to me as if this is sound sense.

A. I do not think that doing research is so easily separable from building research capacity. Just to take one example of a recent venture in this country, which is the European Bioinformatics Institute. The European Union did see the light and at a time when there was a lot of argument over intellectual property rights in relation to the human genome and so on, saw the difficulty of an American monopoly on all the information. They decided they had better look after Europe's interests, and that was very good. That is actually building research capacity. Also, for people to do work in human genome research, there is a whole infrastructure of agents and experimental techniques and technologies which are necessary. One of the things we have done in this country is to build up what is called a Resource Centre, which makes those available so that every university group does not have to build up its own dedicated infrastructure, which would be very cost inefficient. I am happy to say that the European Union has invested in this and is actually using it. There is talk about a transgenic mouse facility in Italy, although the arguments there are a bit more questionable, but I do think that we must attend to infrastructure which includes research careers.

Baroness Platt of Writtle

438. I understand that the European Science Foundation was set up to be independent of the European Union and to be, to a certain extent therefore, capable of criticism of its functions. How effective a mechanism do you think it is in terms of criticism and debate over the Framework Programme?

A. I think that the ESF (I would say this, would I not?) is becoming more effective. Its strength has been that it is a kind of parliament of research councils within Europe; the wider Europe, 56 of them. Its weakness is that it has to work by consensus. For years and years now, the natural tendency for many scientists and many of the people who represent their own research councils in the ESF and elsewhere—perhaps I have to say that it is also true in this country of the Royal Society—so many of the opinion formers have very specific interests in doing little bits or in particular research areas, or particular aspects, or principles as basic as peer review, which is of course very important, but it does not get you very far unless you say how it could be done. But just recently, and the report which you may have seen and which POST has actually commented on, is our first example at asking our member organisations to accept the discipline of what the Framework Programme says it is for, and trying to offer scientific advice on the best way of actually meeting that. We do try and be constructive in our criticism. Therefore, it does not make very good copy for people, who want to talk about political battles and so on between the ESF and the

Baroness Platt of Writtle *contd.*]

European Union. We do not think for science's sake that this would be a good way to go forward.

439. I understand that and I believe in constructive criticism, but we have asked on a number of occasions: what are the outstanding successes as a result of literally billions of ecu having been spent? Apart from the yeast genome we do not appear to hear anything at all. Is anyone saying: "These are the outstanding successes which might be worthy of dissemination, as a good example of what the Framework Programme might achieve"?

A. I might offer the example of AMICA. That is very interesting. At a time when the genetic manipulation of plants was only a gleam in the eye, the Commission did pick up the issue because of the agricultural surpluses and so on. This has all changed now with new markets such as China for food. At least there should be the option that we should grow plants for other things rather than simply feeding humans and animals. It could be said that the European community of plant molecular biology was developed, and much of the work in Europe is a truly world-class standard as a result of that. I would draw other lessons from that. Namely, that it worked because the Commission invested in a long-term way. They allowed the scientific community to develop high-standard scientific programmes with a minimum of interference, and did not switch things on and off every three years or so which tends to happen. Not much comes out of the European Union programme because it is enshrined in the open competition policy, but it is really used to keep the scientific community dancing and begging at the bidding of the Commission. That then means that nobody actually settles down to do something for the Commission over a long period of time. AMICA is a rare example of that. I would say, however—you, obviously from your opening remarks, my Lord Chairman, wanted me to be critical and maybe I am being—that the by-products of networking and European scientists getting to know each other through Europe and to work together, even if the tangible products of the research are hard to see, have been considerable. I do not think that there would have been quite the community of European science that there is beginning to be now without the Framework.

Chairman

440. I wonder if we could follow up this point about genome-sequencing. Would you just confirm: what you are saying is that without the European Union Framework involvement, some of these national programmes would not have achieved the continuity that they certainly have achieved. Do you think that the European Union, in other words, brought something to the party which would otherwise have been missing?

A. I would draw a distinction between AMICA and chromosome 3 of the yeast genome. All the world has been collaborating on genome-sequencing. HUGO has been invented. MUGO is talked about, a mouse-genome organisation. And so on. There were international workshops where people put together the emerging information on human genome going back over a decade. So I draw a distinction between that, which really was an example of the Commission trying to pick a cherry and getting on to a bandwagon which was already rolling, and AMICA, which was an area about which a lot of people were sceptical. It had not really started; nobody knew if it would work; how to get DNA through plant cell walls and so on. "It will be fifty years," some people were saying. So that was an example of far-sighted scientific investment.

Lord Phillips of Ellesmere

441. It was my understanding that the driving force, in that AMICA project, was the collaboration between the John Innes Centre and the Max Planck Society Laboratory in Cologne. The Commission, in a sense, delegated to those two institutes the leadership in that project.

A. Absolutely.

442. So the question is, do you think there is a lesson there for the way that things might better operate?

A. Yes, I do, and they have never done it again. People would rather know who was in charge.

Lord Gregson

443. What the Germans are complaining about.

A. Yes.

Lord Lewis of Newnham

444. In part, Sir Dai has answered my question, but it does seem to me to beg the question of how we go about assessing the programmes as a whole? There are various sets of criteria you can suggest for it. Certainly one that has been suggested has been the success of some major project which you, yourself, have touched on. To me there is another very interesting aspect, and that is the collaborative efforts which have been generated by these particular programmes. What would you anticipate—perhaps it is not a very fair question to ask just off the top—are the significant points to be assessed? That also presupposes that there were any initial aims in the programme, which is the point Lord Gregson was referring to.

A. Well, I do think that assessment exercises tend to be obsessed with process and to ignore content. Of course, the preoccupation of the scientific community is with content: the right projects, the right problems, the right quality of approach and so on. I am not aware of that actually ever having been included in any of these exercises. There are some wise words in the POST report, although as I say it is quite gentle; I suppose it is not POST's business to set itself up as a critic but more as informing. But I think that they talk about the use of external experts in evaluation procedures. That is very important. I mean, experts who are actually from outside and not people who have got a vested interest in the continuation of the programme as it is. Then there is always a problem about getting people to evaluate the programme for what it is and not to say it ought

Lord Lewis of Newnham *contd.*]

to be about something else. In a way that has been the ESF problem; that many of our people have felt that they would really rather not have that but have something else. However, they have to accept the programme given them and assess it against what it is supposed to achieve. I do not usually give gratuitous approval to the philosophy of the DTI, but there is a bit on page 46 of the POST Report with which I do agree: the DTI's rationale of evaluation and approach to it. It gives as an example a problem that the market cannot produce enough widgets. Evaluation should be the objective of the programme which is to increase production by 10 per cent, appraisal of this is scientifically sound, whether monitoring has been carried out in the right way and is producing results. Evaluate whether the programme achieved its aims and would it have been done without our funding, etcetera? That seems to me to be a very sound approach. One must have some sympathy for the Commission. Sitting where I have been these last few years, it has been very obvious that calling for an evaluation has been a way that Member governments have used just for pouring down treacle, slowing things down, making sure things actually do not happen soon. It is a very, very murky area and not all of the problems are with the Commission.

Lord Haskel

445. I was very interested in what you said about the importance of European-wide issues. Do you think that Framework V should include activity in the public awareness of science? Is that the kind of European-wide issue which you think would be suitable?

A. You were kind enough to flag that up in advance. Public awareness of science is very, very important. It is important and essential for the survival of the scientific enterprise. However, I do not think, because it is so important, it means that anything you do or anything you think of under its banner is necessarily to be approved. I do find it difficult to think of where the European added value could be, looking at it from the Commission.

Lord Lewis of Newnham

446. You have referred in the ESF to one of the big problems we have been finding constantly recurring, and that is the success rate of the actual number of applications. This is very low indeed on a relative scale. The ESF has recommended some form of prescreening of the Framework applications and there are clearly going to be problems in this. How do you view this will actually operate?

A. Well, I think it will only work if there is some focus to the programme. It does seem on paper—and from all the noises one hears coming out of the Commission about wanting to achieve more focus—that they will allow outline proposals to be assessed for their appropriateness. When everything is as woolly as it presently is, you cannot do that. I do not see that you can really properly peer review a scientific proposal on the basis of an outline. You have got to see the full thing. I would see the prescreening being on the basis of the appropriateness to the objectives of a programme. I would add, if I may, Chairman, that the administrative infrastructure and experience and know-how of the Commission just makes it impossible for it to carry out a proper peer review process. Member governments have also made sure it could not do it, by delaying the approval of proposals to the last minute, so that the timescale round which decisions have to be made has been ridiculously short. But referring to Lord Phillips' point, I do think that they could make more use of the expertise in peer review that is available in national organisations. Of course, the argument that is often used against it is that you then give the peer reviewing national organisation a kind of inside track. However, I do not see why the Commission—and this is second nature to them and they would probably quite enjoy it—should not play one national organisation off against another. Why not ask the Germans, French, Italians and the others to review in parallel? The answer to that is that the Greeks and the Portuguese would feel left out because they have no peer review to offer, but then they get a special deal in other ways. The POST Report also calls for transparency. We often do not know who is making decisions, who is on committees. You know there are arguments used to counter that. Then, of course, the whole business of confidentiality of proposals which include commercial interests, is difficult. But I would like to see more effort made to think a way through; to develop some such system rather than being against the whole principle of letting anything out of your grasp.

Lord Phillips of Ellesmere

447. On this particular point, Sir Dai, it was my understanding that the Bioinformatics initiative owed something also to the European Molecular Biology Organisation (EMBO).

A. It did.

448. When I was talking about delegating, coming back to that point, the options are not simply national organisations. There are international organisations such as EMBO, which has a very good record itself for coming to rapid conclusions about applications. Might not there be an avenue of approach along those lines?

A. Yes, I am sure. It comes back to the point I discussed with Lord Gregson about scientific infrastructure. I do think that Europe ought to be recognising where its major centres of excellence are and investing in them for the sake of Europe; and using them also in the opinion forming, the opportunities, the idea-generating phase as well. To do that would be to allow control to diffuse away from the centre in Brussels, and my interpretation is that this is the reason it does not happen.

449. The long delays in the processes arise not only because of the peer review element but also the contract negotiations that follow, which seem to take an extraordinarily long time. In the light of your own experience in running a research council, can you see

Lord Phillips of Ellesmere *contd.*]

any reason for these contract negotiations to take so long?

A. Yes. I think the reason is that those in the Commission who devise procedures and criteria about whether there should be research costs (I will not use the word overheads) attaching to fellowship applications and so on - do not actually realise the variation in national practice and how complicated it is. My impression is that a large number of individual cases run into specific difficulties, which have to be considered one by one, and that is very time consuming.

Lord Gregson

450. When I was a member of an assessment panel, I remember being told that there are four principles on which you do your assessment, and you give them numerical values and then you add the four things up at the end. The four things were the project itself, the quality of the institute making the proposal, the quality of the chief investigator, and cohesion. By the time you have added numbers to those, the quality of the project sort of sinks into insignificance. It is self-sustaining nepotism, in effect, in the end, because you are really banking on the people you know and the institutes which you think are premier in this situation. It gets very, very self-perpetuating basically. Except for cohesion, of course. You always chuck the lame dog in at some stage.

A. When I was on a panel I am afraid we ignored cohesion.

451. I am surprised you were not severely lectured by somebody.

A. Even those from cohesion countries did not want it; they wanted to win the projects on their own merits. But I am afraid this is another symptom of the administrative mind. They want a mechanical approach. The administrative mind, of course, is always suspicious of scientific judgment. That would rather come to conclusions without scientific judgment, thank you very much. It is inconvenient that the only way you can decide the merit of a project is by scientific judgment.

452. So you finish with a set of numbers instead.

A. Yes.

Lord Craig of Radley

453. Is there anything you would like to add to what you have already said about the research community view of the value of the Framework Programme?

A. I believe one reason why we have this crisis in the success rates, to which Lord Lewis referred, is that more and more people have begun to understand how to find their way through the Byzantine procedures and make an application. A reason why this country has done rather well in terms of *juste retour* is perhaps partly hunger, we need the money, but partly also because the various research councils and DTI have gone out to help and invested in an office in Brussels, to try and help people to apply. When processes were obscure, it kept the number of applications manageable. This has therefore been convenient.

454. How should the Framework Programme be evaluated? We have talked a great deal about input and how to analyse the best ways. We have talked about focus. You have talked about various pan-European issues like environmental health, health care, agriculture, for example. But I am not conscious, at the moment, of any procedure or really any organisation which sits down and says: "We have done jolly well there. But that was a waste of money; we will avoid making those mistakes again." What is your perception of that?

A. I do think that evaluation is a very difficult thing to achieve. Again, to come back to an earlier point, I do not see how it can be done without introducing an element of judgment. There are certain scientific judgments. There are certain people in the Commission, amongst whom my good friend Paulo Fasella was an absolute wizard, who are very good at spotting performance indicators which could show up the programmes in a good light. Certainly I would like to see an element of structure, such as being clear about what the project is for and what was the problem to be solved; what was the reason for choosing a particular research approach and what was the output, and so on. And involving—and this is difficult, I think—people who are independent, not wishing actually to whitewash the programme, nor wanting to knock it. Most people have got a starting position which is one of those things. If you are going to carry out a proper evaluation you have to do that, but maybe you have just to accept that.

455. There is another way of tackling this and this is saying, "Although we will go ahead with this programme, we believe there are certain objectives or milestones or targets which we will aspire to." This is before you actually start the work. Then at some time later you judge whether or not those aspirations have been realised. Is that asking too much of a scientist?

A. No, that is a reasonable approach. It also ties up with the point I discussed with Lord Lewis, that if you are going to have a pre-screening process you have to have focused sets of objectives, and if you have those you can carry out the two things. The Commission has been omnivorous in terms of scientific activities and objectives and so on, saying, "Whatever is going, whatever is hot, whatever is fashionable, we will have it". That also has the disadvantage of course that, as another good friend, Sydney Brenner, has said, the last time to try and jump on a bandwagon is when you see it beginning to move over the hill; you have to get on early. Now I think the Commission is attempting to focus on its own bandwagons for the sake of Europe, in the fifth Framework Programme. This is something we should help it to do, and all sorts of benefits will follow.

456. Do you have no sense that, if money is to continue to flow into research programmes on a scale at least as good as it has been and hopefully better, it will be necessary to convince the non-scientists and accountants and all of those who look at these things economically? Unless the scientific community is able to demonstrate progress and a return for those

Lord Craig of Radley *contd.*]

investments in the research field, they are going to find it extremely difficult to expect to go on getting as much money?

A. I do accept that, but then the Framework Programme is not run by the scientific community, it is run by a bunch of officials in Brussels.

Chairman

457. I wonder if I can move on now to the Joint Research Centre which I referred to earlier? When, some five years ago, this Committee looked very briefly at the projected fourth Framework Programme, we did have some reservations about the concept of top-slicing research funds to the Joint Research Centre which was, after all, an in-house research capacity. I am really not quite clear how the present roles and priorities are perceived. I wonder, nevertheless, if we can talk about the justification for the concept of having a research capacity which is effectively an in-house research capacity receiving top-sliced funds in part? Would you comment on the justification for this Centre?

A. I have very little direct experience—I have some but very little—of the Joint Research Centre, but I am happy, as you suggest, to talk about the concept and principle. I think those of us who have been associated with research councils in this country are aware of the dangers of top-slicing money and investing it in large institutes which then go their own way and are not placed in competition with other activities. The principle of top-slicing in that way is not one which I have a great deal of sympathy with. I think also it is dangerous to have too big a distinction between that which is apparently immortalised and that which is turned on and off every few years. I think one really does need a spectrum of research support with medium-term commitment as well. Lord Phillips has mentioned the EMBL for example, investment in the EBI, the European Bioinformatics Institute, things of that nature which it seems to be impossible for the Commission to make a long-term or even medium-term commitment to. So I do not like it on the grounds that I think quality control is difficult unless it is placed in some sort of competition with all due recognition to its long-term nature, and also because there is a very sharp division between bits and pieces and big chunks.

458. You may not have had much experience, and from what you say perhaps you have not, of how assessments and evaluations are undertaken within the Joint Research Centre but are you aware of any such procedures?

A. I do not know what goes on there.

Lord Phillips of Ellesmere

459. There is, my Lord Chairman, one example of an activity in the JRC which Sir Dai might have a view on, and that is their relatively recent setting-up of a unit to study alternatives to animal experiments. Do you think that is a reasonable thing to keep in-house in the Commission, or are there other alternatives within Europe which could have dealt with that?

A. I have heard about this, I do not know much about it but I think it is ridiculous.

460. Thank you.

A. I can explain why. Alternatives to animal experiments are, of course, important but they have to be developed in the context of real research problems. I just do not see how they can be hived off.

Lord Lewis of Newnham

461. Would it not be true, my Lord Chairman, to say that there are people who have been investigating this particular area?

A. Yes.

462. The Nottingham group have been doing this, I believe, at some stage?

A. Yes, there are and in this country there are organisations like Frame and so on. One respects them but I would not put a large amount of public money into them; let us see what they can do. There is another point we have not actually touched upon although we have talked about research objectives and we did talk about public awareness of science, but obviously, especially with the Greens and the European Parliament and views in Germany and so on, showing you are serious about diminishing animal experimentation in research is a good thing to do and it might take pressure off the Commission. Throwing money at an insoluble research programme just to show political virility is something we also know about in this country. So we cannot throw stones, but we should not encourage it.

Chairman

463. To go back to the justification for the Joint Research Centre, in the written evidence which came to us from the Commission they did suggest it was helpful to have a source of impartial scientific advice, and they specifically quoted nuclear safety where it might be inappropriate to go to the French or the British, for example, in order to determine the safety of practices which have been conducted by either country. Would you comment on whether that amounts to a case for having a Centre?

A. We, of course, in the Medical Research Council use precisely this argument in relation to toxicology and nutrition in the Prior Option Study which is going on, so there are circumstances in which it is correctly used! But I think you have to look at the particular case. It should not be immune from quality control, it has to be the best science, it has to have a good technical base. There should still be quality control even if you accept it should exist.

464. Some of the written evidence we have had suggested that somehow or other the scientific community felt that the Treasury procedures as applied in this country were discriminatory in the sense that other Member States did not pursue the same policy of attribution, although I have to say that in evidence Sir William Stewart gave before Christmas he did demonstrate research councils probably did not suffer although it is possible some of the departmental funding did. Would you like to comment on the issue of attribution and whether you

Chairman *contd.*]

are seeking from our own Treasury a change of procedures?

A. I do have a problem with attribution, which is not so much to do with taxing research councils, although that is an argument, and there are others around the table who know what goes on there. (I do not really know myself what goes on when the money is found.) I do see a tendency for planning input, priority formulation, for European programmes actually being influenced by attribution, so that a particular ministry might say, "We will only support elements in the programme which suit the priorities we feel at the moment", which might be very short-term, which might be political or policy rather than scientific. This can also lead to games being played to shuffle attribution around, so the real issue of what is the best programme for Europe and for this country in a European context actually gets lost. I will give one example of that—I do not know but I have reasons to believe this is a valid example but how can I be certain—there is much hand-wringing in Europe about the lack of venture capital investment in biotechnology companies, start-up companies and so on, that we missed the information technology start-up revolution and people have been saying we must get in on biotechnology. But our track record is not that wonderful. Actually it is better in this country than it is in other countries in Europe, but it is still not wonderful. If you look at what is happening in the United States, you see that with most of the start-up companies where money can be made by exploitation of biotechnology it is in the health area. Of course in the middle to longer term there will be a pay-off, as I indicated in agriculture or in chemicals with the environmental clean-up and whatever, but for the moment to get going, to get the commercial biotechnology bandwagon rolling in this country, we need application to health. The great advantage that the United States has is that they have the National Institutes of Health which within them include the full spectrum of research from basic molecular biology, biotechnology, to clinical studies in health, so within the one organisation you have health problems and very basic approaches all combined. That creates a culture within which scientific advance is readily linked to applications. Only in this country and to some extent in France, but only to some extent there, do we have that sort of organisation, and I think where it exists you can see the benefits of it. The history of Germany in particular, but other countries as well, is to have clinical things separated off from biology, which does not encourage the coming-together of opportunities and technologies. So how did the Commission set-up its biotechnology and its health programmes? It set them up by having a pimple, which was the Bio Med programme, separated off from bigger biotechnology programmes which are orientated in completely different ways. I am sure part of the reason for that is that in particular countries they got advice from where business interests were, for instance, Novo in Denmark, but I suspect it reflects also the British influence which came from the compartmentalisation of health from industry from agriculture within different ministries in this country.

465. That was the advice from different civil servants? That is not a consequence of attribution in any shape or form, is it?

A. You understand I am speculating but I have got grounds for this speculation; people tell me things. If people in different, small patches have priorities which relate to the immediate needs of those small patches, then they will put those priorities higher than big objectives across the whole lot. So I think attribution actually puts the blinkers on thinking about issues which really should be long-term in research.

Lord Gregson

466. Is there not a very, very advantageous tax system in America for start-ups? You can write off the whole of your losses at start-up against tax. It makes an enormous difference.

A. And the way shares are traded. There are all sorts of factors. I think we would get more people trying to do it, even with the patents laws and so on, if they actually saw the opportunities.

Lord Gregson

467. What are your thoughts about the cost effectiveness of carrying out research on the Framework Programmes compared with the single-minded approach of a national programme? Do we put this down again to the need to spread things?

A. I think it always tends to be money round the edges.

468. It cannot be cost effective, can it?

A. It is parasitic. People are grateful for it, it is more money and researchers tend to think any money, for anything, with any strings, has to be a good thing, and to some extent it does help people to get on with what they want to do, but it is back to this point of a proper research infrastructure, proper focus, proper orientation, proper review. All of those things are very difficult to fit into the Framework Programme, so the implementation is as you say.

469. Very beneficial to the airline industry!

A. Yes. It helps to keep European air fares so high, I should think!

Lord Phillips of Ellesmere

470. My understanding has always been that the money university scientists get to support their Framework Programmes seldom covers the full cost of the research.

A. That is correct.

471. So they have to get money from other sources, presumably from the dual support system?

A. Yes.

472. So, as my colleagues here have heard me argue from time to time, at the limit universities which are too successful will go bankrupt?

A. Yes.

473. Can you see any objection to the Commission being prepared to entertain applications which genuinely cover the full cost of research? What would

Lord Phillips of Ellesmere *contd.*]

be the problem with that? It is a thing which has national spill-over in our system, of course, which I consider at the moment with its emphasis on overheads to be—although I accept some responsibility for it—bordering on the lunatic.

A. The problem is political, I think. Last time round, the last time there was a row about this, was to do with fellowships in the Training and Mobility programme and it just so happened there were various scandals about American university presidents having yachts and furnishing their offices and things like that, and somebody in the European Parliament said, "This must never happen. How do we know this is not happening?" So it is partly superficial thinking of that sort, and it is partly that the EU wanted its name branded on the foreheads of the best scientists, so putting all the money into salaries, even though they got more than their heads of departments or whatever over here, made them very attractive to people. That is another example of superficial thinking, which is another factor too.

474. It seems to me that the Framework Programmes—and I hesitate, my Lord Chairman to get into this definition jungle yet again—are essentially pre-competitive in that they involve collaboration between numbers of universities, numbers of industrial organisations and so on. It is, I think, notoriously difficult to evaluate what the long-term effect of research of that kind is. There have been many attempts, for example by the American economist, Mansfield, to demonstrate that investment in this sort of research by the American Government has led to enormous effects on the American economy, but that is a very long-term and difficult argument to pursue. Is this partly what lies behind the problem of evaluation?

A. Yes, I think it is. People want a cause and effect relationship between a particular break-through preferably, or a particular experiment and a big earner.

475. So we are back to the linear model?

A. Certainly.

476. And the fact is that it is much more interactive than that?

A. Certainly. In fact the Green Paper, *Inventing Tomorrow*, which sets out a kind of philosophical background for that programme, starts off by debunking the linear model and then goes on precisely to develop things which are hard to distinguish from.

Lord Lewis of Newnham

477. Really as a reflection of that, having recognised the considerable difficulties in this sort of evaluation/assessment, how far do you believe that the new programmes, or the programmes in Programme 5, should relate to what has been happening in 4; the idea of continuity? We have at least the impression, and I say it is an impression, they are now changing to some of the more social science orientated subjects.

A. They have great aspirations and maybe that reflects in part the political philosophy of the Commissioner. Europe's big problem is unemployment, another big problem is transport and urban congestion, and all these are problems of social science and there may be hopes somewhere there are some quick fixes which could be found. On continuity, I do not see the argument for continuity given that, as I was discussing with Lord Gregson, the programmes are little bits and pieces added on to existing activities anyway. If there were substantial medium to long-term activities like AMICA, then there would be an argument for considering continuation, but since there are not I really think it could be a clean slate. Of course, this will offend the vested interest of people who have actually come to depend on the Framework Programme.

Chairman] Sir Dai, we are most grateful to you for the great help you have given us.

WRITTEN EVIDENCE

SUBMITTED TO THE SCIENCE AND TECHNOLOGY COMMITTEE (SUB-COMMITTEE I)

Letter from Dr Jan Borgman, Chairman, European Science and Technology Assembly

The European Union is to a large extent, if measured by its financial transactions, a wealth redistribution engine, with favourable results concentrated in the economic periphery of Europe. The European Union can not survive very long if that were to remain its identity; there must be a promise of accomplishments which have appeal to all member states. Science and Technology can be such an area of promise and it could be a growth area if handled well. In the more likely zero-growth scenario for the immediate future, the EU programmes should gain impact by concentrating the resources on a smaller number of topics. The intentions of the European Commission, as presented in their document "Inventing Tomorrow", are a first step in that direction but the principle is in need of broad political support to stand a chance for survival in the programme definition phase.

I notice the concern of the Lords that the UK gets enough value for money from participation in the fifth Framework Programme. This healthy concern is not different from similar feelings in other member states. However, an objective analysis of the question is probably even more difficult than the related question whether national research generates sufficient value. All partners should answer these questions for themselves, in the perspective that sub-optimisation for a one-dimensional set of values is only part of the story; well before many others and far ahead of his time, it was Sir Winston Churchill who articulated the need for European unity in a broad sense. Even now, half a century later, he appears to be ahead of the sober reality. At any rate, it is clear that there can be a win-win situation only if participation generates an added European value; this requires a careful selection of the topics for research in the EU programmes, as well as ingenious management. After initial reservations I have come to the conclusion that there is considerable quality in the Brussels management, deserving to be entrusted with more responsibility than is possible under the tight political control which is so characteristic of the European Union. Some of that control could well be relaxed in favour of more effective accountability.

The priorities for the next Framework Programme are likely to be set in the next half year. The question of priorities, raised by the Lords, is therefore very timely. Should the emphasis be on basic, applied, pre-competitive or near-market research? In my opinion, the dominant requirement for each type of research will have to be quality, meaning that the research must match or be superior to what is done elsewhere. As before, the EU will have a problem to position its niche too near the market in view of the intra-European competition. Basic research, targeted in limited areas of promise, is an attractive option but will have to be balanced with the new missions of the research councils. It has been suggested that the European Commission should boldly move for strategic alliances with the major national research councils. After all, it is there that the bulk of the funds is allocated; moreover, the research councils are in the best position to know where research targets can be met.

This is not to say that all research must be targeted around potential wealth creation. Innovation has to do with the unexpected and can hardly be programmed. Einstein is not the result of science policy. There must remain a good measure of freedom for the gifted, curious to understand unexplained phenomena and capable to predict the unobserved, thus guiding the research effort towards progress. The EU has maintained its contacts with this type of research in the "Training and Mobility of Researchers" programme; a broad consensus is growing that this programme has to be preserved in the fifth Framework Programme, together with its characteristics.

Jan Borgman
Chairman of ESTA

18 November 1996

Supplementary letter by the Confederation of British Industry

During our evidence to the Committee on 13 November 1996, a noble Lord expressed surprise that CBI was supportive of the Framework programme. Further questioning was concerned with boundaries between national, European and global markets. We would like to reemphasise three points and provide some additional evidence.

Funding Research in Europe

The CBI believes there is a role for provision of research funding at the European level, but this must be in the context of the global market. Research at the European level should be targeted at European objectives (and not confused with those of individual national objectives). The reason for this is that it is impossible for companies to maintain expertise, or indeed maintain a watch on new and emerging technologies. Therefore companies need to look elsewhere to enlarge the pool of expertise to which they have access. Indeed one of the key characteristics identified in the DTI/CBI report "Innovation: the best practice", is that leading companies are open and seek out ideas from other sources—that is they do not have the "not invented here" syndrome.

Furthermore research collaboration can act as an effective mechanism to initiate the development of strategic partnerships which can assist with accessing new markets or developing a critical and sustainable market share.

CBI/NatWest Innovation Trends Survey

I have attached some figures from this and last year's Innovation Trends Survey. A positive balance denotes an increasing trend in collaboration compared to a negative one, which indicates a decrease.

As you will see from the figures the most significant trend for increasing collaboration outside the UK is with either the EU or the USA.

TRENDS IN INTERNATIONAL COLLABORATION

Q. *What have been/are expected to be the trends, in real terms, in collaboration with . . . ?*

	Academics/universities			*Other companies*		
	1994	*1995*	*1996 (planned)*	*1994*	*1995*	*1996 (planned)*
Overall	+29	+31	+45	+32	+41	+46
In UK	+30	+30	+43	+22	+35	+36
Other EU	+4	+10	+16	+25	+21	+28
USA	−4	+10	+10	+15	+19	+24
Japan	0	+3	+7	+8	+7	+9
Other Pacific Rim	0	+3	+6	+18	+11	+13
Other countries	+1	+4	+4	+14	+7	+11

European v Global

During our evidence it was questioned why focus on European research as opposed to global? We believe that these two approaches are not exclusive. Also many companies do not have the resources to develop and sustain partnerships across the globe. Consequently the Framework Programme can provide a stepping stone to wider sources of technology.

In our evidence we strongly argued for increasing the level of external international collaboration in the Framework Programmes and this should be integrated with the thematic programmes. The consultation mechanism and the projects themselves are the most appropriate mechanism for identifying where collaboration would prove beneficial. Such access should be clearly reciprocal—for example do European companies have reciprocal access to American programmes?

In conclusion, the CBI believes much greater emphasis should be placed upon the outcomes and exploitation routes of Framework Programmes. We do not believe that there is sufficient justification for expansion in the Fifth programme.

Dr Philip Wright
Technology Group

4 December 1996

Supplementary letter by the Economic and Social Research Council

I am writing to supply the additional information which the Select Committee requested on UK applications to the first Targeted Socio Economic Research Call for Proposals in the Fourth Framework Programme. The number of applications involving UK researchers was 99, remarkably close to the estimate of 100 which we gave. In 23 cases, UK researchers took the lead and, as you know, 13 of these 23 have been funded. This is a very commendable success rate of 56.5 per cent. From the total of 99, 52 were funded (52.5 per cent).

I would like to take this chance to reiterate that many of the successful applications are from individuals or teams which have won awards from ESRC in our own open and very competitive processes, and we believe that this first Call has funded a great deal of high quality research. As I hope I made clear at the hearing, we believe this to be the result of the large pent-up demand for resources for comparative social science research on European issues, and of the peer review advice given to the Commission from the UK and elsewhere. It does not obviate our concern about the ability of DGXII to handle social science research effectively, particularly when defining research needs.

If I may, I would like also to return briefly to the distinctions between basic, strategic and applied research. In our written evidence we supported the OST view that the Framework Programme should not fund basic research. At the hearing, I believe I also made it clear that in some cases these distinctions are not particularly meaningful for us, but perhaps I did not say enough about why that should be.

We have always believed the Frascati distinctions between applied, strategic and basic research to have limited classificatory power for the social sciences. ESRC does not support much work which could be described as basic theory; the subject matter of almost all our awards are institutions, policy processes, and human behaviour. In general, much of this is most comfortably classified as strategic or in the new category of "oriented basic", which ESRC recently introduced along with other Research Councils.

Others, including some academic researchers themselves, might argue that this same research is curiosity-driven and therefore basic. However, these are finely-shaded differences and my point is that arguments about the boundaries are often pointless, or even counter-productive, in our field. The ESRC position is that the strategic label covers our interests and the interests of those social scientists likely to wish to apply for EU research funding.

Professor Ronald Amann

12 December 1996

Memorandum by the Engineering and Physical Sciences Research Council

BACKGROUND

1. The Engineering and Physical Sciences Research Council's (EPSRC's) response to the House of Lords Science and Technology Committee's call for evidence into the Framework Programme and European Research is based on the following premises:

- the EU Programmes should be seen to complement national programmes—not replace them;
- there should always be a perceptible and plausible element of "added value" relative to national programmes in what is done through the EU framework;
- the application procedures, decision making processes, and mechanisms for the dissemination of results should all be simple, open and transparent.

The principle of subsidiarity should be applied consistently across all programmes.

2. Experience to date suggests that the following programmes within Europe have been very successful and have met the basic premises at paragraph 1:

- the programmes focused on the training and mobility of researchers;
- networks for the joint setting of objectives, sharing of ideas, and dissemination of results;
- research relating to standards and regulatory requirements;
- programmes which widen access to major facilities operated principally for a national requirement;
- research programmes with clearly focused industrial objectives (eg the Industrial Materials programme).

3. Programmes which have been less successful, from an EPSRC perspective, have been:

- the activities of the Joint Research Centre (JRC);
- programmes where the original prospectus was poorly defined, where expected outputs had not been identified, or where the nature of the programme restricted meaningful national involvement to a small number of companies or academic partners.

4. Although EU programmes are intended to focus on the treaty objective of improving European industrial competitiveness, there are two broad, and to a degree conflicting, approaches:

- encouraging those countries who are weaker in technology to "catch-up" with the strongest in Europe;
- enabling those countries who already have technology that is globally competitive to stay at the forefront of the field.

If Europe is to compete with the US, Japan, the "Tigers", and the cheap labour economies of the Pacific Rim and Eastern Europe, then it must be prepared to invest and capitalise on its scientific, engineering and technological capabilities in order to keep its strongest technology developers in the forefront internationally.

5. Since competitiveness is the principal driver for the EU Framework Programmes, industry and proxy bodies (such as the Confederation of British Industry or the Chemical Industries Association) and trade associations should have a major voice in shaping the content of these Programmes. Opportunities for technology "push", eg through ensuring the basic health of the underlying scientific and technological endeavours, are matters best seen as being within the arena of national agencies, with greater effort being applied on the EU front to identify true market "pull" opportunities with added value. The role of European-wide industrial organisations could also be important in identifying generic technology needs for particular sectors—for example, we are aware that AllChemE (an umbrella group for the European chemical industries) is taking such an approach. The national Technology Foresight programme has demonstrated the

effectiveness of "providers" and "users" jointly agreeing the national research agenda, and there could well be merit in a formal "Euro-Foresight" exercise preceding the formulation of the Fifth Framework Programme (FP5). We will watch with interest the role of the Task Forces set up last year by the EU Commissioner for Research and Technological Development (RTD) to "co-ordinate research in Europe".

6. The following paragraphs address the specific issues identified in the Select Committee's Call for Evidence.

DIRECTION

What lessons should be derived from the Fourth Framework Programme?

7. The Fourth Framework Programme (FP4) is still in its early days. Nevertheless, there already are many lessons to be derived, the most notable from the EPSRC perspective being as follows:

(i) *Monitoring and Evaluation:* The EPSRC strongly believes there is a need to develop and put into place an improved monitoring and post-hoc evaluation procedure whereby the success (or otherwise) of individual programmes can be judged against prior expectations and the value of investment in the research can be assessed. Such procedures can also be used to inform direction and content of future programmes. The EPSRC welcomes the annual review of FP4 which should allow problems to be identified and programmes to be re-directed as necessary. However, we also believe that these reviews could be developed further by identifying strengths and weaknesses in the current programme more clearly, taking account of rapid changes in research and technological development.

(ii) *Training and Mobility of Researchers:* The Training and Mobility of Researchers (TMR) programme of FP4, and its predecessor (Human Capital and Mobility of Framework 3) have proved to be enormously successful both in respect of the training of researchers throughout Europe (ie TMR Fellowships) and through the widening of access to major national facilities (TMR Large Scale Facilities Programme). The programme satisfies the essential premises identified in paragraph 1 and should be broadened to allow for continuous professional development of individuals in mid-career. In expanding the programme, TMR should consider an increasing engagement of industry.

(iii) *SMEs and Technology Transfer:* The change of orientation in FP4 towards an output driven approach was welcomed by the UK, but the structure and organisation of FP4 is perceived as often being confusing to industry. Access to programmes, particularly by SMEs and the transfer of the resultant technology, can therefore be hindered. On the other hand, the UK has an excellent mechanism for encouraging technology transfer to SMEs through, for example, the Teaching Company Scheme (TCS), and there might be merit in looking at the TCS in an EU context. The "Faraday" concept for technology transfer to SMEs could also be worth looking at in the EU context.

(iv) *Joint Research Centre:* There has been widespread concern about the value of the Joint Research Centre (JRC). If the JRC is to have a role within the EU, this should be secured by having to compete fully and openly against other research providers. The UK Government has pursued this approach vigorously in dealing with the status of research institutes and publicly-owned laboratories within the UK, and the UK line on the JRC's status should be the same.

(v) *International Co-operation:* Any ear-marking of funds for Eastern Europe and the Newly Independent States (NIS) of the former Soviet Union needs to be kept within acceptable bounds. Bearing in mind the prime objectives of the Framework Programmes, it is not immediately apparent why provision for an international co-operation programme should feature in this part of the EU activity.

(vi) *Other EU Programmes:* The distinction between FP4 and some of the other research programmes (eg COST) remains somewhat obscure in places. It is recognised that efforts are being made to remove this obscurity, but progress on this front is very slow.

(vii) *Administration:* Irrespective of the administrative realities, the Framework Programme has an image problem. It is perceived to be slow in response and lacking in transparency in its peer review procedures.

Should there be a Fifth Framework Programme? If so, what should be the main objectives or focus and how should the priorities be set?

8. The benefits to the UK from the Third and Fourth Framework Programmes (FP3, FP4) can be judged to be very substantial, if measured on a *juste-retour* basis. UK Institutes of Higher Education (HEIs) have proved themselves to be very adept at penetrating the EU system—this being especially noteworthy within the ESPRIT and BRITE-EURAM programmes. Particular attention was given by the DTI and the Science and Engineering Research Council (SERC) to the complementarity of these programmes to UK national programmes. Thus, if for each component part of FP5 the simple premises given at paragraph 1 were

addressed, and the lessons learnt from paragraphs 2, 3 and 7 were implemented, then good value for money could be obtained.

9. In terms of objectives and priority-setting, we believe that this should principally be driven by the views of industry and their perception of market requirements. The EPSRC does not therefore see itself having a key role in the identification of research priorities for FP5. However, on general structure issues, if "market pull" is to be the driving influence, there may be merit in a sector approach rather than in a generic technology approach for the division of programmes. Regarding programme focus, programmes in earlier Frameworks have been somewhat diverse, and a tightening of objectives in future would be desirable. This would help to avoid the situation—as at present—whereby virtually any research project can be submitted within the scope of an FP4 priority field: in such a situation, the expectations of applicants are falsely raised, much nugatory effort is expended, and success rates are very low.

What should be the balance between basic and applied, pre-competitive, and near-market research funded through a Fifth Framework Programme?

10. We believe that the issue of basic versus applied research is one which can only be sensibly addressed once the overall objectives of the Programme have been formulated and research priorities identified. Different programmes will require different balances of effort, although in general terms the present overall balance is probably about right. As a matter of principle, the Framework programmes should not deal with near-market research and development, which should be left to the market.

What should be the role of Task Forces in the Fifth Framework Programme?

11. The EPSRC understands the objectives of the Task Forces to be to define research priorities in consultation with industry; to provide better coordination of projects within FP4; and to consider further cooperation between undertakings and further supplementary programmes.

12. Whilst welcoming the Task Forces' objectives, the EPSRC firmly believes they should not be used to drive national or EU research programmes, but used to identify potential areas of cooperation and collaboration. They could, for example, assist with the identification of programmes which could be more effectively addressed at the European rather than at the national level. The Task Forces should not be used to direct national programmes, nor should they become directly involved in allocating funds or managing projects/programmes under the Framework Programme.

Can it be demonstrated that the UK gets clear value for money from participation in the Framework Programme and, in particular, what has been the impact on industrial competitiveness, social and economic sectors?

13. It is certainly the case that HEIs (and other organisations) in the UK have been successful in obtaining funding through the Framework Programme. In that sense, the UK achieves excellent value for money by participating in the Programme. Less tangibly, UK institutions have established and participated extensively in networks with continental bodies which must bring benefits to the UK—however hard it is to quantify such benefits.

PRIORITIES

What should be the role and priorities of the Joint Research Centre, and how should its activities be funded?

14. The principal role of the Joint Research Centre (JRC) is to undertake research and technological development in support of EU policy issues. However, we believe that this work should be put out to competitive tender and the JRC exposed to market pressures to ensure efficient use of resources.

How should the EU meet its "cohesion objectives" of enabling SMEs and Member States with less scientific expertise to benefit from the Framework Programme, while ensuring that the highest scientific standards for EU research are met?

15. We have already drawn attention (paragraph 4) to the conflicting requirements of the EU's cohesion objectives and (in paragraph 7(iii)) to the general problem of technology transfer to SMEs. One possible solution might be a form of "variable geometry" whereby only those member States capable of undertaking research to the highest scientific standards are invited to participate in particular projects/programmes, coupled with appropriate mechanisms which provide for fair access to the resultant technology on a European-wide basis, sympathetic to the intellectual property rights (IPR) of participating partners. An example of a highly successful UK mechanism for encouraging technology transfer to SMEs is mentioned in paragraph 7(iii).

FUNDING AND ADMINISTRATION

Does the European Commission have the adequate expertise and the mechanisms to support the Framework Programme?

16. The Commission has at its disposal an excellent team of scientific administrators but, as mentioned earlier, the Framework Programme has an image problem and a number of its mechanisms need to be improved. In particular, it is perceived to be slow in response and lacking in transparency in its peer review procedures. Current EU monitoring and post-hoc evaluation procedures appear to be uneven, and although no research funding agency has yet come up with the correct formula, the Commission needs to keep looking for improved evaluation procedures whereby the results of its programmes can be judged against prior expectations and the value of the research investment assessed. Evaluations from earlier programmes should also be used as inputs to future programmes. Robust mechanisms for the transfer of technology to industry—and particularly to SMEs—need to be developed.

Is the current length of Framework Programmes too long and would they benefit from shorter time frames with more flexible funding? Alternatively, should the Programmes be longer?

17. We do not have any strong views on the length of Framework Programmes, although the current length of four years is probably about right. The key criteria are that the programme aims, objectives and priorities should be determined before the start of the Programme; monitoring should take place at regular (but realistic) intervals during the course of the Programme so that priorities can be re-assessed and re-directed as appropriate; the results of individual projects/programmes should be widely disseminated as expeditiously as possible after completion of the project/programme; and the results of the Programme should be evaluated as soon as possible. The degree of flexibility of EU funding should be broadly comparable with that under which national R&D programmes operate.

Should Task Forces have ear-marked funds to support their own research programmes?

18. The Task Forces should provide recommendations and fulfil a steering role for cross-programme issues with an applied or strategic focus. On the basis of their recommendations, new programmes could conceivably be established under the framework structure of the day. We would be concerned, however, if the Task Forces became directly involved in allocating funds or in managing their own specific programmes, as this has the potential for detracting from any administrative cohesion which might otherwise be brought into Framework.

How should the UK allocate funding for the Framework Programme and other EU research initiatives to ensure that UK researchers are not disadvantaged?

19. We have already said that we believe that programme priorities for the Framework Programme should principally be driven by the views of industry and their perception of market requirements. Accordingly, the principal source of UK funding for these programmes should be derived from those Whitehall departments having a responsibility for the health of British industry.

20. Regarding the interests of UK researchers, UK academic researchers have participated fully in Framework Programmes 2, 3 and 4, subject to UK funding constraints, and have in turn provided an excellent return on investment. Academic researchers have a unique and vital contribution to make. Thus if we are to obtain best value for money from the Framework Programmes, it is essential to sustain and enhance strong UK academic participation because of the world-renowned strength and quality of the UK's science and engineering base. The corollary is that in order to sustain the strength and quality of this base, UK funding to the HEIs through the Science Vote should not be diluted in order to help defray the costs of the UK's financial contribution to Framework.

SUMMARY

Lessons to be derived from FP4

The EPSRC welcomes the annual review of FP4 which should allow problems to be identified and programmes to be re-directed as necessary, but believes that these reviews could be developed further by identifying more clearly the strengths and weaknesses of the programme.

The programmes focused on the training and mobility of researchers have been very successful and should be broadened to allow for continuous professional development of individuals in mid-career. An increasing engagement of industry should also be considered.

Access to programmes by SMEs should be simplified, and robust mechanisms for the transfer of technology should be put in place.

The JRC, if it is to have a role within the EU, should be required to compete fully and openly against other research providers.

Any ear-marking of funds for Eastern Europe and the Newly Independent States of the former Soviet Union should be kept within acceptable bounds.

The distinction between FP4 and some of the other research programmes (eg COST) remains somewhat obscure in places.

Irrespective of the administrative realities, FP4 has an image problem.

The Fifth Framework Programme (FP5)

The EU programmes should:

- be seen to complement national programmes—not replace them;
- provide a perceptible and plausible element of added value relative to national programmes;
- have simple, open and transparent application procedures, decision-making processes, and mechanisms for the dissemination of results.

If for each component part of FP5, the simple premises listed above were addressed and the lessons learnt from FP4 implemented, then good value for money could be obtained.

The main objectives for FP5 should principally be driven by the views of industry and a perception of market requirements.

Balance between basic and applied, pre-competitive, and near-market research

Different elements of FP5 may well require different balances of basic and applied research. In general terms, however, the present overall balance is probably about right.

Framework programmes should not deal with near-market research and development, which should be left to the market.

Rôle of the Task Forces

The Task Forces should be used to define research priorities in consultation with industry and to provide better co-ordination of projects within the EU. They should not be used to drive national or EU research programmes.

Value for money

The benefits to the UK from participation in the Framework Programmes can be judged to be very substantial, if measured on a *juste-retour* basis.

Rôle of the Joint Research Centre, and the funding of its activities

The rôle of the JRC should be to undertake research and technological development in support of EU programmes and policy issues. However, this work should be put out to competitive tender and JRC exposed to market pressures to ensure efficient use of resources.

Cohesion objectives versus scientific excellence

Mechanisms need to be developed and put in place whereby the treaty objectives of these two conflicting requirements can be achieved.

Framework mechanisms

Procedures for the monitoring and post-hoc evaluation of Framework Programmes need to be improved.

Robust mechanisms for the transfer of technology to industry—particularly to SMEs—need to be developed.

Length of Framework Programmes

The current length of the Framework Programmes is probably about right, but:

- programme objectives and priorities should be determined before the start of the programme;
- monitoring should take place at regular (but realistic) intervals;

- research results should be widely disseminated as expeditiously as possible after completion of the programme;
- overall results of the programme in terms of value for money, economic and social impact, etc, should be evaluated as soon as possible after completion of the programme.

Ear-marking of funds for the Task Forces

The primary function of the Task Forces should be to play a key co-ordinating role between programmes. They should not therefore become directly involved in the allocation of funds.

UK funding for Framework

The EPSRC believes that programme priorities for the Framework Programmes should principally be driven by the views of industry and by a perception of market requirements. Accordingly, the principal source of UK funding should be derived from those Whitehall departments having a responsibility for the health of British industry.

If the UK is to obtain best value for money from the Framework Programmes, it is worthwhile to sustain and enhance strong UK academic participation because of the high strength and quality of the UK's science and engineering base.

14 October 1996

Memorandum by Mr Tim Gatland

INTRODUCTION

I am a technology practitioner with experience in both SME and larger companies and I am also a member of ITEC Foresight panel. I have been involved with earlier Framework programmes and have been monitoring the development of the Framework V Programme. The following are personal opinions and are not necessarily the views of either my employers or the Foresight panel.

DIRECTION

1. *What lessons should be derived from the fourth Framework programme?*

It is too early to judge the complete effectiveness of the Fourth Framework Programme, but I believe that the following lessons can be observed. These comments should be taken in the context that there is a great deal of valuable work which is being done in the programme, and we are at the half-way stage of the process.

Major Comments:

(i) The demonstrator programme is too fragmented. The demonstrators should be larger, but that there should be fewer of them.

(ii) The focus of Framework IV is too near-market. Co-operation between competing companies is harder where the possible exploitation is sufficiently close.

(iii) The practice of partially funding a large number of projects needs to be reviewed. Creating 100 projects which are half funded is not necessarily better than having 50 properly funded ones.

(iv) Further streamlining of the administrative processes in the Framework programme needs to be carried out.

(v) The annual reviewing process should be improved by including appropriate subject experts in the review. The EC simply does not have enough technical expertise in their staff to adequately determine how projects are progressing.

(vi) The basic research projects would benefit from much closer co-operation with industrial partners.

2. *Should there be a fifth Framework Programme? If so, what should be the main objectives or focus and how should the priorities be set?*

I emphatically believe that there should be a Fifth Framework programme. The objective should be the further development of the co-operation of academic and industrial research organisations in Europe to improve European competitiveness in a global market.

I believe that Information Technology, Electronics and Communications are essential areas of research and collaboration to ensure that Europe remains competitive. I also believe that these areas should be treated as a single initiative, and any separation between them is artificial.

Key areas of specific focus should be:

- Development of standards, particularly in communications and networking.
- Further development and standardisation of the technology infrastructure.
- More programmes covering the societal acceptance of, and influence on, technology.
- A small number of properly funded demonstrators in the areas of multimedia, broadband communications and IT/Communications convergence.

3. *What should be the balance between basic and applied, pre-competitive and near-market research funded through a Fifth Framework Programme?*

The focus should be a return to more basic research, essentially recognising that the cycle of the Framework Programmes has been to start at basic research with the first Framework programme, and moving on to near market exploitation in Framework four. This first cycle is now complete and a new Framework programme should include a larger element of more basic research to generate the technology to provide exploitation opportunities in the middle part of the next decade. New ways of involving companies in this basic research programme should be developed, but it should be recognised that commercial co-operation in EC funded basic research has not always been very effective in the past. The near-market exploitation initiatives should focus on infrastructure development rather than specific product development.

4. *What should be the role of Task Forces in a Fifth Framework Programme?*

There are several potential roles for the Task Forces:

- The Task Forces could co-ordinate the big demonstrator projects. In this role they would co-ordinate the output of relevant Framework projects and other research projects and provide a showcase for the application of technology.
- The Task Forces could provide a measurement, monitoring and evaluating body in specific areas such as network or computing performance, speech recognition, system usability etc. In this role they would allow objective measurement of the results of both Framework and other European research. (This technique is used extensively in the USA to encourage the development of technical sophistication in specific areas.)
- The Task Forces can be focused on "grand ideas" with a mission to encourage and co-ordinate the subsidiary projects (both Framework and other research) to achieve their particular goal.

5. *Can it be demonstrated that the UK gets clear value for money from participation in the Framework Programme, and in particular, what has been the impact on industrial competitiveness, social and economic sectors?*

The DTI regularly provide information on the relative costs of the programme to the UK compared with the amount of Framework money which is spent. In addition, we see the following benefits:

- UK companies get visibility of how other European companies are directing their research.
- Standards, particularly in the area of communications, evolve more quickly and with pan-European consensus.
- UK academic institutions get financial support and the ability to work with leading-edge companies and academics across Europe. This model of co-operation is now being modelled within the UK in the "Virtual Centres of Excellence" (VCEs) which provide a way of focusing specific expertise across a number of academic and industrial organisations.

PRIORITIES

6. *What should be the role and the priorities of the Joint Research Centre, and how should its activities be funded?*

The jurisdiction for the JRC appears unclear, and it is not obvious that it is an essential in achieving excellent research in Europe.

7. *How should the EU meet its "cohesion objective" of enabling SMEs and member states with less scientific expertise to benefit from the Framework Programme, while ensuring that the highest scientific standards for EU research are met?*

I recognise the importance of the cohesion aspects of the EU, but believe that the current way of encouraging incorporation of "junior" partners in projects is counter-productive. I believe that the Framework Programme must be totally driven to achieve excellence in its chosen areas of research. This means that the project partners must be selected on purely meritocratic grounds.

The cohesion objectives should be achieved using technology transfer mechanisms and these must be treated as a separate activity from the main projects. The budget for this activity should be less than 10 per cent of the total Framework budget, except where infrastructural projects are involved.

The issue of SME involvement in the Framework programme is a recurring theme. The nature of the Framework programme makes it burdensome for a typical SME to play a lead role in the programme. However, a great many SMEs play very active roles as subcontractors to large companies or as junior partners. Some modest incentive could be provided to further encourage larger companies to involve SMEs in their proposed projects.

Funding and Administration

8. *Does the European Commission have the adequate expertise and the mechanisms to support the Framework Programme?*

On a purely administrative level, the EC has the mechanism to support the Framework Programme. In terms of truly enabling the success of Framework projects, the project review process needs to be completely changed. The current process relies on EC officials to review the status of projects on an annual or biannual basis. This is typically an "administrative review" of the project milestone plan—measuring progress against planned progress. This leads project teams to retain focus in unfruitful areas (which might have appeared relevant at the start of the project) and to achieve milestones in those areas, at the expense of more applicable work.

I believe that project reviews in the Fifth Framework should always include experts in the subject area of the project. These experts could be from internationally recognised institutions (preferably pan-European) or professional bodies. The EC could go one step further and entirely delegate the measurement and review of projects to trusted third party organisations and in so doing would improve the quality of the review process and improve the opportunities for the success of the projects.

9. *Is the current length of the Framework Programmes too long and would they benefit from shorter time frames with more flexible funding? Alternatively, should the Programmes be longer?*

A number of programmes have suffered from being restricted to four year programmes, although five years is a reasonable maximum. If the programme was extended, it is essential that projects have a two year break point and the possibility of redefinition of the scope, objectives and funding for the project. Where a project is shorter than four years, some further flexibility should be provided in the financing to allow components in the project to be re-scheduled within the overall project budget and timescale.

10. *Should task forces have ear-marked funds to support their own research programmes?*

Task Forces should have some funds to support their own research, although as far as possible they must be encouraged to make use of all relevant projects in the Framework Programme. One suggestion would be to provide funding of three types:

- Money to fund research directly;
- Money to buy-in externally available technology;
- Money which can be allocated to extend existing Framework projects to enable them to develop appropriate components for the Task Force projects.

Such funding should not distort the overall objects of the framework programme.

11. *How should the UK allocate funding for the Framework Programme and other EU research initiatives to ensure UK researchers are not disadvantaged?*

This is a very important activity and requires that considerable resources be assigned to it. The following key activities will improve the results the UK will gain from the programme;

- Key experts must be nominated to develop the work programmes for the Fifth Framework Programme;
- The DTI must co-ordinate the Framework Programme with small groups tasked to track and provide UK input to each programme;
- In areas where the UK has been traditionally weak in getting funding, the DTI should encourage and broker the development of consortia of companies and academic institutions to bid.

OTHER COMMENTS ON THE FRAMEWORK PROGRAMME

1. *Non European Organisations*

At the moment the involvement of non-European organisations is de-emphasised. In some areas of technology, this is extemely counter-productive. More flexible ways of involving external partners need to be evaluated and project proposers should be encouraged to the organisation which will best leverage the European skill base.

2. *Unsolicited proposals*

The Framework programme should provide a small reserve to allow projects to be funded which are outside the strict confines of the call for papers. A number of relevant projects with significant European benefits are not funded because they are outside the scope of the call.

27 January 1997

Memorandum by the EU Industry, Research and Development Advisory Committee

DIRECTION

1. Since Framework Programme IV is in its second year of implementation, it is of course much too early to draw any specific lessons (eg with regard to its impact on the competitiveness of European industry). However, there are a number of general observations which can be made:

— There is a growing interest from the side of the research community in the Framework Programme.

— This growing interest is the result of the contents of the Framework Programme (its quality and relevance) on the one hand and of cuts in national RTD budgets on the other.

— Thanks to the Framework Programme, many networks have been created across Europe, whereby researchers from different countries work together to develop new know-how.

— However, as a result of the overwhelming interest, there is a high over-subscription, which leads to frustration and disappointment.

— It is also an indication of the fact that, at European level, the RTD priorities should be better defined (the current Framework Programme is too much of a shopping list).

In case concrete lessons need to be derived from the Framework Programme, there is a need for measurable objectives and clear indicators.

2. There should certainly be a Fifth Framework Programme. However, this should not be a mere continuation of Framework Programme IV. There is a need for something new, something different. The reason for this is that the world is changing. As an example, industry is currently going through a period of drastic change, due to the increasing globalisation of production, of science and technology, the continuing concentration on core activities, and the increasing shortening of product life cycles. The way in which industry is changing at the moment has the character of a "new industrial and social revolution". The progress made in the field of micro-electronics, information and communication technologies is not only resulting in dramatic changes in products and services, but has led to a complete restructuring of the manufacturing process and also of the organisation and management of other economic activities such as transport. Also, in the field of health and agro-food, drastic changes are occurring as a result of progress in biotechnology.

Given the changes in industry and society as a whole, the Community Framework Programmes cannot simply be continued as "business as usual". For this reason, Framework Programme V should be different from the current one, Framework Programme IV. Future Community RTD programmes should be characterised by a concentration on a limited number of key actions of importance to European industry and society. These programmes should embrace a "challenge-oriented approach" whereby specific and clear objectives are set.

3. IRDAC believes that, at Community level, there continues to be a need for programmes on generic technologies. These programmes should primarily focus on the advancement, integration and combination of existing technologies as well as on the development of new emerging ones.

IRDAC believes that the European RTD programmes should aim at encouraging focused fundamental research; research based on the needs of industry and society. Non-targeted or blue-sky research should not be financed.

4. IRDAC considers the Task Forces Industry-Research a useful mechanism as a platform for bringing the different actors together for discussion and to ensure selectivity and concentration across the European RTD programmes. With their current activity of clustering projects at national and European level around themes of interest to European industry, the Task Forces will allow an identification of technological bottlenecks and, hence, a definition of future research actions. IRDAC believes that the Task Forces themselves should not be the source of funding but merely provide possible targets for spending by the European Commission. For the Task Forces to be effective, IRDAC believes that they should consult

industry more systematically and focus on the whole production or product cycle, involving both the suppliers and users of technology. IRDAC believes that within the European Commission greater effort should be made to co-ordinate the different Task Forces and ensure more transparency. At the moment, many questions are still being asked about the objectives of the Task Forces, their working methods and consultative structure. IRDAC is of the opinion that the existing Task Forces should first be tested and assessed before the new ones are created.

5. As mentioned under point (1.), it is difficult to draw any specific lessons from Framework Programme IV. However, with regard to previous Framework Programmes, IRDAC feels that it can be said that they have given "value for money". However, in future, "value for money" may be identified more easily if programmes have measurable objectives and are tested against performance indicators.

Still, it should never be forgotten that the Framework Programme represents only three per cent of all public expenditure in the field of RTD in Europe. With three per cent of expenditure one cannot expect 20 per cent of impact.

PRIORITIES

6. On numerous occasions, IRDAC has advised the European Commission on the JRC. As said in the latest IRDAC Opinion on the JRC:

> "Today an organisation such as the JRC would have never been created. However, since it exists, it has to be drastically restructured and re-organised to meet the challenges of our modern society. In this regard, IRDAC is in favour of the following measures:
>
> > further continuation of the rule that the JRC instruments have to obtain about 25 per cent of their income from contracts with third parties under a competitive system. Those institutions that meet this objective need to be rewarded by being allocated additional staff and funding; those that fail need to be cut;
> >
> > the current legal and administrative status of the JRC needs to be revised to allow it to become more flexible and react quickly to the needs of the market."

7. According to IRDAC, "cohesion" should never be a criterion for selecting proposals. The only valid criteria for IRDAC are quality and relevance. However, in the field of the Framework Programme, it also has to be realised that there are Member States and regions which are, from a scientific and technological point of view, less developed.

These countries should be well represented in the Framework Programmes, which can be done by:

- special information and assistance activities for these countries
- use of the structural funds to develop a sound knowledge infrastructure in these countries
- special actions for medium and low-tech SMEs (along the model of CRAFT)
- special efforts in the field of dissemination and exploitation of RTD results (although IRDAC is sceptical about the cost-effectiveness of this).

FUNDING AND ADMINISTRATION

8. IRDAC believes that the quality of the Commission officials who work in the field of science and technology is very high. In general, they have a good knowledge of the field which they are responsible for and are motivated. To ensure that this continues in the future, it is essential to continue selecting them on the basis of quality (and not nationality), provide regular management training courses and create mobility.

9. IRDAC considers the current length of the Framework Programme to be good, as it ensures continuity. It is also considered useful that the different Framework Programmes overlap for a one-year period. IRDAC is, however, very worried about the current legal procedures concerning the adoption of the Framework Programme and the specific programmes. In a modern world, where things go faster every day and product life cycles are increasingly becoming shorter, the procedure of co-decision does not seem the most appropriate (as it may lead to delays of three years!).

Inside the Framework Programme and the specific RTD programmes, enough flexibility should be built in to allow a reaction to emerging needs or challenges. Such flexibility may be realised through more general workplans which are updated every year or by setting up a reserve fund of five per cent for unforeseen actions.

10. As said under point (4.), IRDAC believes that the Task Forces should not be "spending programmes". They should be no more and no less than working groups identifying bottlenecks and needs for future research. They should have a very small operational budget (eg for studies).

11. Since the Framework Programme is part of the overall EU workplan, it is funded by the EU budget, to which all Member States, including the UK, contribute. This situation should be continued.

A situation which IRDAC does not favour is that of the UK attribution model, whereby UK companies which receive money from Brussels are cut in their funding by the UK agencies. IRDAC believes that research organisations should participate and be encouraged to participate in the EU Framework Programmes because of the added value of their programmes and not because of the funding available.

18 December 1996

Memorandum by the Institution of Civil Engineers

The specific questions listed in this enquiry are in several cases subsidiary to more general questions of policy, over which some degree of contention still remains; this presents some difficulty in addressing the specific questions.

DIRECTION

Questions 1 and 5 need to be considered together. There will inevitably be lessons on organisational and administrative aspects to be drawn from the Fourth Framework experience at this time. However, the broader consideration of its value is almost impossible to determine by explicit consideration of its outcome, and quite certainly not yet. Such explicit considerations will be dependent on evidence from the parties involved, and such submissions should be viewed with great caution.

One explicit and down-to-earth angle on value for money for the UK is the need to ensure that a fair proportion of the budget is spent within the UK, although it could be debated whether "fair" should be defined in proportion to contribution to the budget or in terms of the potential of the UK R&D community. This has not been achieved in many fields so far, probably in part due to a relatively low rate of applications from the UK.

Questions 2 and 3 are similarly linked; question 3 can only be answered in the light of question 2, and this opens the very general question of policy. There are clearly at least two objective fields in which the EC has every right to presume a justification to commission research in the interests of the EU, in the same way as the Government does for UK interests. The topical parallel in the UK is the work of the Building Research Establishment for construction. These fields are

- support for regulation and standards;
- tackling social or environmental problems in which success cannot be measured in terms of commercial profit and the programme output must be essentially in the public domain.

These are reflected explicitly in the Fifth Framework proposals in relation to civil engineering, both in support for preparation of standards, and in substantial parts of the Environment programme, for example such issues as the effects of the rise in sea levels. Facilitation of intermodal co-ordination of transport might also be cited as a public social objective.

Question 3

None of the phases can be neglected, and basic research should certainly not be reduced to less than 10 per cent of the total. A suitable proportion for new market research might be 35 per cent, depending on its character. Thus a sensible allocation would be 15 per cent, 25 per cent, 25 per cent, 35 per cent for basic, applied, pre-competitive and new market phases.

Question 4

A greater part of the programme seeks justification in the EU Green Paper on Innovation and the general conclusion that competitiveness within the EU would be best served by R&D expenditure allotted to multinational teams co-ordinated by Task Forces set up by the Commission. This is supported by evidence that European businesses spend a significantly lower proportion of their product on R&D than their counterparts in the USA or Japan.

This supposition is open to challenge in respect to civil engineering. A few points of achievement might include: composite floor construction on permanent steel formwork; applications of tunnel boring machines; altazimuth-mounted telescopes, radiotelescopes and satellite tracking antennae; high-strength concrete practice; the aerofoil deck for suspension bridges; and various procedures in water resource development and waste water treatment. While some of these have developed collectively by small advances, others have been the result of a single gifted insight and determination, supported by a small team with a fostered experience and expertise and by a national laboratory which operates with considerable flexibility and local autonomy. Tendering a study programme or Task Force would in many cases not achieve the same results.

"Managed Programmes" in research are currently popular, but there would be some advantages in a return to a more personal approach. This would be reflected in diversity of the roles for the Task Forces. The extended role which is currently envisaged may well be appropriate in the environmental field, tackling broad social objectives. In the more commercial fields a greater degree of stand-off would be desirable. In some cases action encouraging greater R&D as an integral part of business might be better value, but the EC structure does not provide effective channels for this.

The foregoing leads to these suggestions:

- The Fifth Framework Programme necessarily involves an act of faith on its socio-environmental and (EC) government-service aspects; once the decision is taken a Task Force approach will often be justified.
- The commercial side as currently envisaged is too heavily structured with Task Forces, Coordinated Programmes and other mechanisms; there is an argument for "letting business get on with it". Near-market research is better fostered by improving the climate for eventual profit by the instigator than by submission to the judgement of a review panel or a Task Force.

PRIORITIES

Question 6

Major advances often come from gifted individuals or small teams. It is debatable therefore whether the benefits of cross-fertilisation by focus within a Joint Research Centre would outweigh the benefits of a wider spread to small teams.

Question 7

Similar considerations apply as for question 6. In civil engineering it is not clear that the smaller member-states are disproportionately weakly represented in research, given that small teams are empowered. Benefit in the sense of industrial application may be another matter, but not a matter for the Commission DG for Research.

However, centres of excellence could be nominated to lead major projects, comprising families of specific topics which must be examined to bring the whole to conclusion. Some of the more straightforward sub-topics can then be let to research establishments with lesser experience under the supervision of the expert project leaders.

In this way, research techniques and philosophies become better understood and disseminated amongst all the participants of the major theme. All can contribute to the overall strategic plan and can see where their own participation fits. Research skills can be simultaneously used and developed, whilst under expert control and guidance.

This presupposes that centres of expertise have been identified on the basis of competent, knowledgeable staff and stock of relevant equipment and resources.

FUNDING AND ADMINISTRATION

Question 10

Yes.

16 December 1996

Memorandum by Professor Jean-Pierre Contzen, Director-General of the EU Joint Research Centre

THE ROLE OF THE JOINT RESEARCH CENTRE

1. The mission of the Joint Research Centre is to provide the European Union with a scientific and technical capability, directly attached to the Commission, contributing to the formulation and implementation of Union policies. The JRC is the "corporate research laboratory" of the European Commission.

2. This leads essentially to the JRC concentrating in the future on three types of activity.

   (a) Perform research responding to the objectives of the Framework Programme in areas where the central role of the JRC is clearly recognised. The customer is the European Union itself.

   (b) Perform, still within the Framework Programme[1], activities of a scientific and technical nature in support to those Directorates General of the Commission responsible for the formulation and implementation of Union policies other than Research Policy. These Directorates General are the direct customers of the JRC.

   (c) Perform, within the Framework Programme or outside of it, scientific and technical work on a competitive basis. The customers are those selecting the JRC among competing bidders.

---

[1] This is in conformity with Article 130f of the Treaty. "The Community shall have the objective of strengthening the scientific and technological bases of Community industry and encouraging it to become more competitive at international level, while promoting all the research activities deemed necessary by virtue of other Chapters of this Treaty".

3. Analysing, in the reverse order, these three types of activities, the following considerations can be developed:

- Competitive activities—these activities fulfil at least four purposes: first to bring to the JRC a source of income outside of its allocated budget; second: to measure the competitiveness of the JRC on the open market and thus provide a strong incentive to maintain or increase scientific quality and reduce costs; third: (not the least important) to transfer knowledge and to make available scientific facilities to economic operators; fourth: the participation of the JRC in shared cost action programmes of the European Union, one new form of competitive activity since early 1995, reinforces the links between the JRC and public sector laboratories, universities and/or industry in the Member States, on the basis of the transnationality clause in these programmes.
- Scientific and technical support to Union policies other than research—The European Commission has precise responsibilities in the formulation and implementation of Union policies, defined in the treaties and attributed by legislative acts adopted by Council and Parliament. In all countries the discharge of such responsibilities implies the assistance of the technical body to the political and administrative authorities. Such a body needs to be recognised for its competence and its neutrality. At the Union level, where Member States' interests are not always identical, independence and neutrality are of utmost importance. The JRC also provides an in-house capability, being itself a service of the Commission. As is the case at national level, in order to be efficient, one must be able to translate into scientific and technical terms the broad policy requirements of the customer.
- Research contribution to the Framework Programme—In certain specific areas of research responding to the objectives of the Framework Programme, there is a consensus that it is to the benefit of the Member States to concentrate research around a focal point at the JRC in view of its scientific competences, or of its specialised facilities, or both. This responds to the principle of task sharing between the various actors on the European scene avoiding duplication and cost inefficiencies generally. Where the JRC acts as a central point in the research, it does not act alone and works generally as the reference point of networks. Examples can be found in the work of the Institute of Transuranium Elements at Karlsruhe, which is one of the major (the other is in the USA) reference points for knowledge on actinides, in the work of the Institute for Reference Materials and Measurements at Geel, which concentrates all European efforts on nuclear measurements and standards, in the unique facilities such as the European Microwave Signature Laboratory and the European Laboratory for Structural Analysis, both at Ispra, and in the work of the Centre for Earth Observation which constitutes the focal point for European efforts in the brokerage of space earth observation data.

THE CRITERIA FOR SELECTING THESE ACTIVITIES

In order to perform efficiently the three types of activities described above, three sets of criteria must be applied:

- Activities should be customer driven. The customer, the user should always be clearly identified, the need must be clearly expressed.
- Activities should be of the highest quality and integrity. Scientific excellence is a sine qua non condition to ensure an efficient contribution to European endeavours, so as to enable the JRC to secure its postion in a highly competitive environment.
- Activities should offer a European added value. Subsidiarity requires that JRC activities offer such added value justifying the intervention of a research structure situated at European level. This added value could be the European dimension of the research carried out, the contribution to the strength of Europe and its industry, or the need for neutral expertise to the benefit of the Member States but independent from them.

Customer, quality and Europe constitute the three key words for guiding the activities of the JRC.

THE PRIORITIES FOR THE JRC ACTIVITIES

The current and future priorities for the JRC activities must fit exactly within its role and respond to the criteria enunciated above. In these priorities, there is a mix of continuity and evolution. Continuity is justified by the permanence of some needs, evolution is guided by the changing priorities in the European Union.

At this stage, and without prejudging the final scientific and technical content of the Fifth Framework Programme, the following priorities emerge:

- Reinforcement of activities contributing to policies which have a direct impact on the European Citizen: environment, consumer protection, health, fight against fraud (the last named deserving particular attention).
- Refocusing of activities contributing to the competitiveness of industry, with a strong emphasis on normative aspects, notably in the fields of advanced materials and structural mechanics.

— Developing activities responding to both the objective of industrial competitiveness and the needs of the European citizen. The areas to be covered are, among others, control of fissile materials (safeguards), safety of the nuclear fuel cycle, development of new reference measurements and reference materials, development of new applications for Earth observation data from Space, performing technological watch and technological foresight.

In the area of competitive activities, attention should continue to be focused on work for external third parties and on participation in shared cost action programmes, but new forms of commercial activities should be promoted, such as the setting-up of a technology park or other forms of joint ventures with the private sector.

The Commission has yet to take a position on the question of the percentage of JRC activities which should be carried out on a competitive basis under the fifth framework programme; I therefore refrain from addressing this issue in the present note.

Jean-Pierre Contzen

14 January 1997

Supplementary letter by Professor Contzen

In response to your request, I have prepared the following examples of current Joint Research Centre (JRC) activities.

In co-operation with the Commission's Safeguards Directorate, Luxembourg, and following a request from the German government, the JRC (Institute for Transuranium Elements (ITU)) has analysed more than 20 confiscated materials (including the much publicised plutonium and lithium seized at Munich Airport in 1994).

The diversity and the high accuracy of the analyses enable a "fingerprint" of the seized material to be obtained. This enables the previous history of the material to be understood and provides clues as to its origin with the aid of a data bank.

The role of the JRC in this field was recognised at the Essen Summit and resulted in several projects in the frame of the TACIS and PHARE programmes. ITU staff also frequently appear as expert witnesses in the courts or parliamentary inquiry committees of Member States concerning so-called vagabonding nuclear materials. The institute is actively involved in the work of the P-8 International Technical Working Group on Illicit Trafficking of Nuclear Materials.

Biomedical reference materials, which are needed for the development and verification of the accuracy and correctness of diagnostic test kits (eg pregnancy, hepatitis, diabetes, certain cancers), are now certified by the JRC (Institute IRMM).

An agreement with the International Federation of Chemical Chemistry, signed in October 1996 by Commissioner Edith Cresson, provides for reference materials produced on the basis of projects proposed by the IFCC to be tested and certified by the Institute. Revenues from sales of the resulting materials are shared by IFCC and the Institute.

Collaborative research on a commercial basis is carried out by the JRC (Institute for Advanced Materials (IAM)) in the area of materials requirements for improved design and operation of high temperature components for power generation plants. Evaluating the work carried out, Professor Regis of ENEL (the Italian electricity utility—the customer) recently wrote:—

> "All the individual subprojects have carried out excellent experimental investigations, according to the state of the art, some of which have been anticipated in specific papers. The findings are generally in good agreement with the most advanced conclusions reached by large manufacturers or with the practices under testing by other utilities. These results are highly valuable since they would allow extended scientific exchanges of information and know how with other international laboratories, with other end users, with the Original Equipments Manufacturers (OEM) and their subsidiary companies in charge of material and coating processing".

The MARS project (Monitoring Agriculture with Remote Sensing) carried out by the JRC's Space Applications Institute (SAI) provides constantly updated agrometeorological information enabling accurate monitoring and extrapolation of crop development in Europe and beyond. The approach is based on an agrometeorological model drawing on weather data (rainfall, temperature, radiation evaporation . . .) and agronomic data (growth state, water content, biomass produced, grain weight etc). The advantage of the system is that it provides homogeneous information in real time covering a wide geographical area. It is also useful as an early warning system (eg identification of abnormalities in crop patterns of development).

In September 1996 the Council of the EU adopted the Directive on Integrated Pollution Prevention and Control (IPPC) which marks a new era in environmental legislation. In contrast to the traditional approach of setting emission standards of general applicability, the IPPC directive integrates the different pollution media (eg air and water or land) and takes into account both the sensitivity of the local environment and the technological progress. It covers large installations of the most polluting industrial sectors such as the chemical, metal and energy industries. The Best Available Techniques (BAT) in these sectors will be identified by the "IPPC Bureau" through a process involving representatives from the fifteen Member States of the Union and the relevant industrial and environmental organisations. These BAT documents will constitute the main reference once issuing local permits. The IPPC Bureau is established at the JRC Institute for Prospective Technological Studies which holds responsibility for technology watch at European level. IPTS has acquired significant expertise on BAT studies (an analysis of the sectors of ammonia and nitric acid has just been completed) and has won the contract to manage the IPPC Bureau. IPTS will promote the exchange of information and ensure neutrality in the process of finding consensus among all the concerned parties.

The European Agency for the Evaluation of Medicinal Products (EMA), set up at Canary Wharf in 1995, relies for its drug approval and registration activities on the expertise of the JRC. The European Technical Office for Medicinal Products (ETOMEP) (a branch of the JRC's Environment Agency) develops and supports the technical systems needed for the market authorisation procedures and maintains staff in the EMA's premises. The help and support provided by the JRC have been widely acknowledged by the Agency itself and the Member States.

The Eurocodes are design standards adopted by the European construction industry. Eurocode 8 specifies standards that buildings should adhere to if they are to withstand vibration, whether caused by road or rail traffic or even by earthquakes. The standards are checked by a consortium of European laboratories using a variety of methods including computational analysis and shaking tables. The JRC (Institute for Systems, Informatics and Safety (ISIS)) is part of this consortium; its main contribution is the development and operation of the reaction wall facility (unique in Europe) (European Laboratory for Structural Assessment ELSA) which utilises the pseudodynamic test method to test full-scale structures. The validity of Eurocode 8 has been confirmed for bare frame reinforced concrete structures thanks to the testing of four-storey concrete frames in the facility. In addition, the code has been modified to take into account infilling of the building frames with non-structural materials.

ELSA is also used to check methods for retro-fitting in order to protect existing buildings, particularly those of great historic interest, from damage due to vibration.

I have consciously selected examples drawn from widely differing areas of activity and performed on the basis of varied funding arrangements; in no sense are these illustrations comprehensive. It goes without saying that I am at your disposal to provide further examples or supplementary information relating to those given here.

Jean-Pierre Contzen

21 January 1997

Letter from Lord Kennet

I should like to give written evidence to Sub-Committee 1 on the Framework Programme under question 5. Here is my evidence:

I submit that "clear value for money", or its absence, cannot in advance be demonstrated from any programme of scientific research, and that the higher the content of pure, as opposed to applied, research in a programme, the more it is against our national interest to emphasise the question of value for money.

To do so leads to the delusion that one could say: yes, this research is going to be very good value for money, fairly good, noticeable, about zero, a slight negative value for money, a medium negative, or a total loss. Without this delusion, nobody would waste time thinking like that.

If advance assessment of "value for money" had been demanded would Francis Bacon, Newton, Harley, Priestley, Watt, Faraday, Stevenson, Darwin, Rutherford, Florey, Crick and Watson, etc have appeared in our national history at all?

The Committee might wish to inquire into the existence or non-existence of cases where value for money of pure research has been correctly assessed in advance. And having done so it might have the curiosity to go further and ask the same question of advanced applied research.

Under question 11. As long ago as the early 1970s I was a member of the Committee of European Research and Development, which advised the European Commission on precisely these major questions. After that I undertook an intense one year study with a multinational team of 40 into questions very closely related to this and covering—in theory—all fields of science and industry and in all the countries of the then European Community. Then and since it has seemed very clear to me that the way to ensure that UK researchers are not disadvantaged in the European Union framework programme is the same as the way to ensure that UK interests are not disadvantaged in the EU as a whole: that is, to enter wholeheartedly into the common creative work of the Community, and devote a section of our best talents to it. It is a misunderstanding bred of remoteness from the scene that anybody is out to disadvantage UK researchers or interests. Our contribution is earnestly desired in a common enterprise.

4 November 1996

Memorandum by Loughborough University

EXECUTIVE SUMMARY

The Fourth Framework has broadly succeeded in promoting research and trans-European cooperation in the UK academic sector. There is a need to improve the mechanisms of consortium building, particularly in marketing the benefits of the programme to industry. The Fifth Framework should not disadvantage purely scientific research and be flexible in supporting activities where the time between idea and application is short. Targetted research and the Task Force approach would be welcome developments.

The following evidence is presented in response to the questions raised by the Sub-Committee on Framework programmes.

1. *"What lessons should be learned from the Fourth Framework Programme (FP4)?"*

FP4 has not significantly altered the North/South divide in the European science and technology knowledge base.

Universities and research Institutions do not have satisfactory mechanisms for building up transnational research consortia with Industry. Marketing of the fourth framework to industry was poor.

FP4 concentrated on engineering and industrial impact. FP4 was not aimed at stimulating science per se in universities.

Training and Mobility of Researchers Programme within FP4 was undervalued.

The use of electronic systems such as the Internet has progressed very rapidly, with a significant effect on dissemination of information about, and research results from FP4.

2. *"Should there be a Fifth Framework Programme . . .?"*

The Fifth Framework (FP5) should be carried out, with a better balance between engineering, the humanities and science. Particularly, the Programme should be used to Society's advantage, eg developing and implementing transportation policies, to safeguard the environment, and improve the quality of life in cities and rural areas.

FP5 should also be marketed effectively to other sectors of society outside of academia and industry, thus encouraging greater participation.

3. *". . . balance between basic and applied, pre-competitive, and near-market research . . .?"*

A frequently heard comment has been that there is insufficient basic research in FP4. The requirement that projects should be directed at pre-competitive research with potential practical application was too restrictive. The criteria for eligibility should be built around "Wealth Creation", "Quality of Life" and "Society's Needs" issues, with an acknowledgement that basic research, particularly in fields like IT, biotechnology and advanced materials, needs to be supported, where the timescale between a new idea and its practical application can be very short.

4. *". . . role of the task forces in a Fifth Framework Programme?"*

The task force approach of targetted research across themes is an extremely good one. The current task forces such as "Car of Tomorrow" should be continued, and expanded to give more attention to the needs of the consumer. There should be flexibility brought into FP5 to allow for new task forces to be set up and run without eating into the budgets of established activities.

5. *". . . Value for Money . . . Impact on [UK] sectors?"*

There is no clear evidence of a benefit or disbenefit to the overall UK economy from the Framework programmes.

However, there is evidence that the UK does well in comparison to its EU partners in the proportion of FP4 funds won. This has also alleviated some of the dolourous shortfall in research support from national programmes.

6. No opinion.

7. *"...enabling SMEs and Member States with less scientific expertise to benefit...?"*

The enhancement of the Training and Mobility activity, both financially and in its scope (more direct marketing to SMEs to be involved in TMR, transeuropean Teaching Companies Scheme).

The Teaching Companies Directorate is keen to see successful EPSRC funded projects followed up by technology transfer as in the Teaching Company Associate Scheme. A parallel approach should be adopted for FP5.

The funding mechanisms should accommodate young researchers from Southern Europe whose home country's expertise and resources are at a different stage to those of Northern Europe. This would enhance technology transfer, best practice, consortium building, cross-cultural and language skills.

Funding mechanisms should allow for flexibility in assisting researchers at the end of existing contracts to receive extension or new funding. This strand of FP5 should aim for fast response to applications (Suggest a turnaround of 1 month for applications).

8. Yes.

9. *"...Length of Framework Programmes..."*

The current system of fixed calls is too inflexible. More calls, say five-six times a year would be an improvement. If practical, continuous open calls would encourage measured responses from applicants wishing to carry out a specific piece of research, rather than hurrying to take advantage of a "closing window" fixed call.

10. *"...Task Forces..."*

There is little point to having a Task Force without its own budget.

11. *"...UK allocate funding...?"*

The UK is not disadvantaged by the funding structure of the present framework.

10 October 1996

Memorandum by Mrs Eryl McNally MEP

MAIN POINTS

- Increase Citizen-led R&D on:
  safe food,
  support for older people,
  support for children,
  mental pollution-pornography, racism, etc.
- Proselytise R&D and raise citizens' awareness of activities
- Concentrate upon new, emerging or embryonic industries
- Concentrate upon new or emerging, cross-discipline, technologies and tools
- Increase demonstration of new technologies
  Very low pollution cars
  Renewable sources and rational use of energy
- No more "difficult to terminate" programmes such as fusion
- Reduce R&D to declining or mature industries
- Increase funds to the networking of and the facilities for researchers
- Considerably increase dissemination
- Add finance and innovation route requirements to consortia
- EU should directly own patents and ensure they are marketed
- Broaden finance base—more from industry, inspection fees
- Add accountable flexibility for emergencies.
- Increase Basic Research—tomorrow's seed-corn.

INTRODUCTION

1. The European Commission will soon produce its proposals for the Fifth Research and Development programme. The European Parliament has co-decision powers with the Council of Ministers on these proposals and any proposed modifications. The following are some of the ideas that will help to shape my views on the Commission proposals when they are discussed in the Parliament during 1997.

OVERVIEW

2. The Framework Programme is the visible face of an heroic mission. To improve the relative competitiveness of Europe and to co-ordinate the R&D activities of our Member States would seemingly require tools and a budget incomparably greater than what is actually provided. In addition to this the framework programme has to support all the other policies of the EU! Yet the challenge has been accepted. The fifth framework programme, due to start in 1999, will continue the mission but needs to be even more successful.

3. Despite platitudes concerning the need for R&D, Member States seem unwilling to increase funding and for the period of the Fifth Framework this seems unlikely to change as the convergence criteria for monetary union bite. Consequently there is a need to expand the finances by including other sources.

4. Hand in hand with the R&D programme and the widening of the income base is the necessity to proselytise the benefits of R&D. We in Europe seem increasing "tired" in many areas including R&D, seemingly not prepared to grasp opportunities as do vibrant "tiger" economies. We need to re-enthuse and revitalise many of our citizens and business enterprises towards discovery, innovation and a technological future. This could help to counteract the drift from technology that is increasingly evident throughout the educational systems of the EU.

5. There should be clearly seen three strands of equal status: industrial-led, citizen-led and EU policies-led R&D. In particular we need to highlight citizen-led R&D to counteract the view that R&D is mainly for business enterprises. Our citizens must be more directly involved—perhaps with the aid of EU sponsored "citizens' juries" and other awareness raising methods.

6. Unemployment will unfortunately continue to be the most serious problem facing our EU throughout the next framework programme. All the Instruments of the EU and of the Member States should be geared to reducing unemployment concomitant with the global market situation. R&D should play its part. EU R&D must keep uppermost the consequences of its content upon sustainable employment.

FRAMEWORK SUCCESSES

7. Many complain that the framework programmes to date are in some ways unsatisfactory, although these complaints ignore the changes made at the start of each programme and the fact that as yet we are in the middle of only the fourth programme. The response time of critics is considerably less than the possible programme response time which is essentially a four year cycle. The main complaint results because participation in projects is too sought after—they are too attractive! Currently only about one in six applications is accepted—not because of quality but because of lack of funds—only excellent and lucky projects receive funds.

8. Complaints of the lack of quantification of the success in helping competitivity are even more difficult to justify. The programmes were set up to be pre-competitive R&D and so are some steps divorced from industrial application. Other factors, not controllable by the EU, such as industrial investment and lead times, intervene so that no clear picture emerges. This is a familiar problem to many political initiatives—EU funded R&D is no exception and should not be denigrated because of the impossibility of determining precise value for money ratios.

9. Virtually all agree that a major benefit—not quantifiable—is the EU wide networking and intermingling of the scientific and technological community. This non-quantifiable "added value" means that no longer do scientists go automatically to the USA for experience—they now have wider opportunities within Europe. This extends also to the many organisations; industrial, Universities and others that form mutual support relationships thereby increasing the cohesiveness and probably the competitivity of the EU—non-quantifiably!

10. These successes could not have occurred without the framework programmes. Many other successes are apparent but there is still far to go to achieve all the objectives. However even in the context of a budget of only about 3 per cent of all EU R&D (including business enterprises and Member States expenditure) the outcome to date is qualified success upon which to build.

INDUSTRIAL ORIENTATED R&D

11. There is a continuous industrial spectrum that has at one extreme mature industries that are in decline passing through mature active industries, new fast-growing industries, emerging industries and ending at industries in an embryonic stage of development. It is above all the latter categories that should be considered for inclusion in the fifth framework.

12. Mature and successful industries are able to fund their own R&D activities and often do so collaboratively with partners who also compete. Member States should be encouraged to give tax incentives to help this type of R&D—it should not come from the limited framework funds. Arguments about rejuvenation of failing industries should likewise be seen as the responsibility of the individual Member States or of social budgets. One should also be very careful not to be drawn into back-door methods that contravene industrial subsidies agreements entered into with the World Trading Organisation.

13. Embryonic industries will provide future employment but because of their newness have very limited R&D capabilities of their own. They need assistance with pre-competitive R&D as they do not have an industrial support base. Many are SMEs in frontier type work such as Bio-technology or renewable energies and are ideal candidates for inclusion within the fifth framework. These are the obvious industries upon which to target the limited EU R&D funds because the proportion of funds from the EU then become significant. A critical mass of funding leads to a critical mass of R&D!

14. Additional industrial support should come from a large extension of dissemination programmes. Not enough R&D is translated into the industrial arena and this must be improved at an EU level by developing further upon regional technology transfer centres. It needs targeted programmes that match R&D results directly with individual firms or groups of firms, often SMEs, that do not have sufficient management time and expertise to be aware of and to implement innovative technology. This direct, detailed involvement in implementation of R&D should be seen as a high priority.

15. Because implementation of R&D is so important the mechanisms must be improved. Finance is obviously a crucial factor which, however, cannot be solved by the framework programme. But the criteria for selection of participants in projects could include at least a reasonable attempt at showing the path to implementation of R&D results with particular reference to capital for innovation. This would add an obstacle to bidding consortia but there is already considerable over-subscription and so would eliminate those with no realistic possibility of themselves utilising the R&D. It might in any case be useful to include financing organisations as part of a consortium.

16. Not only are there emerging and embryonic industries but there are also emerging and embryonic technologies that will be useful in many industries. Nano-technology for example is growing but has a very diffused parenthood over many disciplines and industries. It needs unifying drive to get significant industrial advantage. Other examples of emerging technologies and tools have similar problems, some well on their way to resolution (eg information technologies), but in each case a unifying drive should be given within the fifth framework.

17. The unifying drives needed in such cases are not just scientific and technological developments but also the bonding together of the different researchers using networks. Already there are networks of excellence within the Brite/Euram programme but such initiatives need considerable extensions with more funds allocated to initiate networks to the stage where they are able to be self-sustaining. There is also a need for certain large, usually costly, facilities (eg a neutron source) that need cross EU funding and EU-wide access. Perhaps there could be integration of these physical resources and networks of excellence to form distributed but co-ordinated EU wide research institutes.

18. There has been a suggestion that Fifth Framework funds should be used for defence industries. What is suggested is that EU R&D be distorted by bringing in the concept of "dual use" so that cash-strapped defence industries can be subsidised. This is a totally unacceptable use of EU funds. The programme would become more heavily weighted to only a few major Member States, would get little increase in sustainable jobs and be counter-productive in the views of citizens towards the EU. The long term objective of civilisation is that the need for this industry should decrease—it is of course already decreasing from its high peak during the cold war. Money put into this industry will thus not contribute to sustainable growth unless a necessary defence industry becomes increasingly a weapons industry with a vested interest in global instability. Hardly what we want as sustainable growth!

19. My personal preference would be to increasingly gear the weapons related industry into a new arm for the emerging space industry—an industry of the future. However the conversion of a weapons industry into a space industry is a wider topic than the fifth framework and EU R&D could only play a small part.

20. The above comments about support for industry-related R&D should have the result of releasing funds by reducing support for mature industries and reducing funds where these are really social or other policy initiatives that should be funded from other budgets. Funds should instead be targeting upon new industries and technologies, networks of excellence and much improved implementation/dissemination activities. Additionally there is a need to develop "benchmarks" that help to measure and guide the impact of the R&D into both industrial innovation and societal impact.

21. Additional funding sources must also be actively sought. A particular long-term possibility is that the EU should, as a legal entity, itself patent inventions arising from its R&D expenditure. There are many possibilities but the object would be to exploit and actively market these patents so that an increasing income results. Other funding possibilities must also be successfully explored.

Fulfilling Other Objectives of EU

22. It is always difficult to terminate programmes; the human capital invested, the defensive mechanisms of those most closely affected and the political fallout from what will be regarded, by vested interest groups, as short-sightedness and wrong thinking make terminating large projects an unusual occurrence. This is one reason why too specifically targeted "task forces" should be avoided. Who would dare suggest terminating, say, the "aircraft of the future", once it had gained momentum? However there is at least one current specific programme, almost wholly EU-funded, that gives no real help to competitivity, no help to employment and no medium term prospects of achievement—some would say "nor any long-term prospects". In all common sense the current fusion programme should be gracefully phased down to perhaps re-emerge in strength in 50 or so years' time. This is not the fault of anyone involved—it is just that we now know that this good idea cannot succeed—this was not known when the project started. The lesson should also be learnt that it is unwise to enter into large, time-indeterminate projects. One should perhaps go even further and ensure that no R&D community grows to rely upon long-term framework funding.

23. Opportunities should not be lost to recover money wherever possible. One particular example which may not be unique is that the framework programme seems to have become subject to open-ended commitments to run certain aspects of the non-proliferation treaty via Euratom. Because nuclear waste re-processing is still growing the inspections necessary for safeguarding are also growing. There is no doubt that the inspection process is necessary—arguably it actually needs a significantly larger budget. However the costs should be passed to the commercial organisations that profit from the re-processing. It should not be part of the R&D budget to subsidise successful industries. Recovering money from commercial organisations should be a priority.

24. The R&D needed for environmental standards should obviously proceed but there seems to be an additional need for a formal organisational system to inform the legislative processes of the EU. This needs to be able to provide scientific advice that is uninfluenced by either Member States or industries. It should also be capable of outlining social consequences of proposed legislation.

25. The search for environmentally safe road transport has to be accelerated. The large companies involved with current technologies seem too slow or too unwilling to successfully develop low pollution solutions such as fuel-cell powered cars. The fifth framework programme should have a few demonstration projects that implement a "car of the future" based upon zero emissions and possibly advanced telematics.

26. R&D into renewable energies and into energy savings is still a priority because of their long term help to sustainable development and considerable employment potential. However, clear development paths need to be formulated in conjunction with the many Member States' initiatives in these emerging industries. In particular there is a need for demonstration projects to encourage industrial take-up. There is much more scope for a combined approach with the agricultural sector.

Citizen-led R&D

27. Citizens relate mostly to R&D that directly affects our everyday lives. This means that health, ageing and food become priorities. However, many aspects within this overall umbrella are not covered by industries because they are not yet seen to be profitable. The Framework programme should be geared to addressing this.

28. The controversy over BSE, pesticides residues and food additives shows the need for a programme of safe food production that is at "arms length" from agri-business in order to concentrate only upon citizens' requirements. Obviously agri-business would need to be involved in order to help with and to implement R&D but the overall direction would probably be counter to many current practices.

29. Everyone wants to age gracefully with full faculties but too many do not achieve this and need additional aids and support. The production and utilisation of suitable aids is a potential growth industry which could be fairly labour intensive. There is no overall industrial base such as exists for, say, aircraft and so there would be a substantial gain from further co-ordinated EU R&D. We need a high profile programme of technological supports for older people.

30. Alongside this is obviously the need to prevent and ameliorate the diseases of ageing. Here again many drug industries have a vested interest in medication rather than prevention. There is little current incentive from any other than hard-pressed hospitals and geriatric centres to become involved with R&D for minimising and more importantly, preventing such diseases and illnesses. There is also a range of other illnesses and diseases that affect all age groups but receive little R&D support even though they are of economic and everyday importance—colds and influenza for example. An EU initiative would give good added value and be directly useful to all citizens.

31. There is also a case for projects for childhood problems especially in areas of knowledge where R&D is scattered but very diffuse. Co-ordination could more rapidly produce significant earlier help to some children and parents. Attention deficit disorders are an example where diagnosis and treatment are as yet at an early state of development.

32. Appalling events over the last few years in child pornography, xenophobia and other extremes of human behaviour suggest that mental pollution of various kinds is a significant problem. The majority of citizens want to see an end to this and so we need research to determine the causes of and the prevention of mental pollution. EU-wide co-ordination could succeed in giving real progress in this vital area.

OTHER COMMENTS

33. There are suggestions that R&D proposals should no longer need unanimity in Council. This is an important area in which the European Parliament has no formal voice but there is no doubt that decision making could be enhanced by some form of weighted voting. A particularly difficult problem however is that smaller Member States fear forced exclusion which is made more likely by suggestions about "variable geometry" in which areas of interest would be mapped out by consortia of Member States. A major reason for the suggestions for variable geometry and consequent exclusion of some Member States is the over-emphasis on industrial R&D. As we move towards an even wider EU, Council will be increasingly locked in inability to agree upon industrial matters where Member States are in competition against other Member States. We thus need to lower the emphasis upon industrial R&D and in general move it further from the market place contrary to the general drift of the last few years.

34. Another area in which the Parliament has little say is in the organisational structure and management systems within the European Commission. The Parliament's real powers are limited to rather draconian budgetary indications and comments upon the recently started annual report of the framework programme. It is right that the Commission should be left to manage its responsibilities but there must also be a corresponding right for the EU to intervene especially when problems occur that are transmitted to parliamentarians. The Commission have moved in this direction and are increasingly open but there should be a formal non-intrusive and non-threatening structure for parliamentary scrutiny during the implementation of the fifth framework.

35. There is need for flexibility to be introduced into future programmes so that a more rapid account can be taken of urgent, new or changed priorities without the need for full prior agreement of Council and Parliament. It would need an agreed limited degree of virement possibilities, an annually agreed contingency fund and a well pre-informed parliament. As BSE has shown such an emergency procedure is very necessary provided arrangements are made to not use it excessively for "political" motives.

36. There are many aspects of the current programme that are not mentioned above because I feel there is no cause to change their direction and I would expect them to continue. This includes such specific programmes as the successful mobility of researchers programme, co-operation with third countries, etc.

37. The framework programmes are an important means of uniting our European Community as well as making it more prosperous and healthier. It would be unacceptable for the overall budget to be cut—instead we must press for an even greater proportion of the EU budget as well as finding additional funding sources.

38. The increasingly missing element in R&D is the "seed-corn" ie the basic non-targeted research from which our grand-children's industries will be built. Our current management of R&D is becoming too orientated towards the results of Delphi and Foresight type exercises which seem to be accentuating the industrial status-quo. This must be curtailed.

CONCLUSION

39. However within the overall framework I have indicated that there should be a drawing back from close to the market place industrial R&D except in emerging industries; a general lowered emphasis upon support for industries that are well able to support themselves. I have indicated that the emphasis should be more towards citizen-led R&D and basic research. When the Commission publish their proposals I hope they will be measured in the general context of this document.

13 January 1997

Memorandum by the Medical Research Council

EXECUTIVE SUMMARY

1. The MRC welcomes the opportunity to contribute to the Select Committee's enquiry. Our submission draws in particular on MRC experience in relation to the formulation of the BioMedicine & Health Programme (BIOMED) and its management. In our view, BIOMED has demonstrated that it is feasible and desirable to create and manage a system of EU R&D funding that complements UK scientific priorities and modes of support, and that adds value to national investment in infrastructure. Nevertheless, there are lessons

to be learnt in relation to the multiplicity of Framework objectives, the strategy for the involvement of industry, and programme management.

2. The considerable challenges to health-care providers across the EU in developing and delivering effective and sustainable health-care provide a rationale for European-level collaboration, for example, multicentre clinical trials, epidemiology and human genetics. We see considerable added value in comparative studies, "pooling" of data and sharing of research material, and in novel interdisciplinary research. Themes that could provide focus and added value in health terms in Framework Programme 5 (FP5) include the ageing population, the impact of environment on health, and vaccines and infections.

3. We consider that it would be beneficial to retain in FP5 an identifiable "health" programme of the scale of BIOMED-II. Consistent with OST's position, we should like to see greater programme coherence, relevance to long term users, and improved award rates—through greater selectivity and focusing. In the context of "users" and prioritisation, full account must be taken of public health and health services needs. We should like to see stronger linkage between clinical and health research and the underpinning basic sciences and emerging technologies, and a greater attention to dissemination and application of research results in practice.

4. There is a need to integrate the Task Force "top down" approach to identifying priorities with that of the programme-initiated "bottom up" reviews, while also strengthening co-ordination across complementary programmes. Task forces should focus on issues of major long term significance. They should not initiate research on their own account.

5. Quantitative evaluation of the overall effectiveness of Framework in achieving its central aim of improving European industrial competitiveness is not yet robust. However, in terms of BIOMED funding to UK academic groups, the UK does consistently better than any other country. We consider that the "concerted actions" (networks) generally provide better value-for-money than do "shared cost actions" (project grants); they are more complementary to national forms of support. Duplication of national priorities and funding mechanisms must be avoided not least because it could cause governments to cut national research budgets.

6. The mission and programmes of the Joint Research Centre have no real bearing on health and biomedical research.

7. Strengthening participation of the less-favoured regions in Framework is a laudable objective but should be addressed primarily outside of the Framework Programme itself, through "structural funds".

8. The Commission has improved its management of BIOMED. There remains room for improving effectiveness and transparency in project assessment, contract negotiation and in programme and project evaluation.

9. We are particularly concerned at the inability of the Framework cycle to commit support to long term studies, in particular major clinical trials, that would span two or more Framework Programmes.

10. Attribution is a matter for the UK Government. Issues of protecting departmental budgets have not unduly constrained the joint approach of MRC and DH in negotiating the structure and content of BIOMED-I and II.

RESPONSE FROM THE MEDICAL RESEARCH COUNCIL

Introduction

1. The Medical Research Council welcomes the opportunity to contribute to the Select Committee's enquiry into *The Framework Programme and European Research*. Our submission draws on our experience in research management, in particular in relation to the *Biomedicine and Health Programmes* (BIOMED I and II). The Council provides the lead for the UK in the BIOMED Programme Management Committees on behalf of the Office of Science and Technology (OST) and in co-operation with the Department of Health (DH). We are also the National Contact Point for BIOMED-II, including for the "Technology Stimulation Measures" which aim to encourage participation in BIOMED of small and medium sized enterprises (SMEs).

Framework Direction

Question 1. "What lessons should be derived from the Fourth Framework Programme?"

2. In our view the BIOMED programme has demonstrated that it is feasible and desirable to create and manage a system of EU R&D funding that complements UK scientific priorities and modes of support, and that adds value to national investment in infrastructure.

3. The distinctive health focus of BIOMED has provided a concentration of expertise on health-specific outcomes and specialised approaches, such as clinical trials, epidemiology and human genetics, that would have been diluted had there been only a single, overarching life sciences programme. Three examples of successful BIOMED projects are described in the Appendix.

4. Consistent with OST's advice to the Commission, we recognise the need for greater programme selectivity and focus. Of other lessons to be learnt, we should like to highlight here the following:

- the multiplicity of Framework objectives (discussed at Paragraph 6) and the contradictions in the Commission's strategy for industrial participation, such as:
    - the goal of "increasing industrial competitiveness" *and* the difficulty of measuring competitiveness and of demonstrating impact;
    - facilitating the wealth creation capacity of a multinational industry such as pharmaceuticals (and retaining their investment in Europe) *and* Commission and governmental policies aimed at regulating the industry (eg in setting drug prices and safety standards);
    - the goal of promoting innovation through special measures for Small and Medium Sized Enterprises (SMEs), when few SMEs see benefits in specifically European collaboration.
- The low project award rate, which is of concern not least because of the high cost to proposers—especially SMEs—of preparing an application (in a recent BIOMED call, 46 per cent of submitted proposals merited support on grounds of quality but funding was available for only 16 per cent). We agree with OST that this should be remedied by greater programme focus and pre-selection (elimination by the Commission Services of proposals that are not relevant, but *not* a preliminary evaluation of quality). We do not favour raising award rates in FP5 by increasing the funds allocated to biomedicine and health;
- the difficulty of funding long-term research, in particular multicentre clinical trials through the four-year Framework cycle (discussed further at Paragraph 22);
- while BIOMED includes a broad base of disciplines and approaches, the separation of areas such as genome research, vaccines and neuroscience between BIOMED and BIOTECH has not been entirely successful, in that co-ordination between the two programmes has barely got off the ground.

5. As will be discussed further in answer to Question 8, the Commission's management of BIOMED has steadily improved. However, because the project assessment system differs substantially from national systems and is not fully transparent, it is almost certainly a deterrent to the participation of potential new applicants and of some key experts as assessors.

Question 2. "Should there be a Fifth Framework Programme? If so, what should be the main objectives or focus and how should the priorities be set?"

The Rationale for Framework

6. National investment in science is driven increasingly by perceived societal and economic needs, and this is much invoked by the Commission in justifying the Framework Programmes. Their scope has broadened over successive programmes. So has the range of objectives, which now include improving industrial competitiveness; improving quality of life; support for Commission policy; distribution of skills through the Union; and strengthening collaboration between European scientists, between European industries, and between industry and the science base. This multiplicity of objectives confounds priority setting for the programmes overall, and confuses applicants as to the issues to which they should attend.

A Framework in which to Address Health Challenges

7. The considerable challenges to providers across the EU in developing and delivering health care strategies that are effective, affordable and sustainable do provide a rationale for European-level collaboration in, for example, multicentre clinical trials, epidemiology and human genetics. We see considerable added value in the following kinds of European collaboration:

- comparative research, particularly in epidemiology and health services and public health research;
- "pooling" and sharing of data, genetic samples or tissues to enhance statistical power and economy in the use of rare research material;
- novel integration of disciplines and technologies not available in a single Member State.

8. In selecting focused biomedical and health themes for FP5, account must be taken of scientific opportunity and feasibility, the needs of long term users, and European added value. Examples of suitable themes include (i) healthy ageing; (ii) health effects of the environment; and (iii) vaccines and infections research. In the context of "users" and prioritisation, full account should be taken of public health and health services needs; it is not clear these are currently given as much weight as those of commercial industry.

9. There is room for strengthening the linkage between clinical and health research and the underpinning basic sciences and emerging technologies. We should also like to see greater attention being given to promoting, monitoring and evaluating the dissemination and application of BIOMED research results in practice—both at the programme level and in individual projects.

10. The *Training and Mobility in Research* (TMR) activities should be more closely aligned to the strategic needs of the specific programmes. TMR must not become a back-door route to a non-targeted basic sciences programme. Greater attention should be paid to the training strategies and competences of host institutions, as fellowships should not be merely a mechanism for providing institutions with cheap pairs of hands.

Question 3. "What should be the balance between basic and applied, pre-competitive, and near-market research funded through a Fifth Framework Programme?"

11. As in the national context, we would argue that—in the area of health—new programmes should be based on a variety of disciplinary and technological approaches from molecular biology, to whole organism and population-based research. It is clearly not appropriate to attempt to deliver health-oriented research objectives on the basis of short-term strategic and applied research alone.

12. The Commission has suggested that it will move away from the simplistic linear model in which Framework occupied the middle "precompetitive" ground between basic and near-market research. It foresees a shift in FP5 towards basic and applications-oriented research. Such a strategic change must be justified in the context of a clear and coherent rationale for Framework as a whole, and it is not clear that the Commission has one.

Question 4. "What should be the role of Task Forces in a Fifth Framework Programme?"

13. To be of real value, the task force approach should focus on major issues of long term significance and not merely on easy targets and short term policy or industry-led objectives. In BIOMED-II, the Programme Committee systematically identified opportunities, needs and priorities through Field Reviews (eg in Ageing, AIDS, brain research, cancer, cardiovascular disease and clinical trials), and these should inform priority setting too. There is a need to integrate the Task Force "top down" approach with that of the "bottom up" programme-initiated Field Reviews, while also strengthening co-ordination across complementary programmes.

Question 5. "Can it be demonstrated that the UK gets clear value for money from participation in the Framework Programme and, in particular, what has been the impact on industrial competitiveness, social and economic sectors?"

14. A recent UK Treasury report on the *Relationship between Public Funded and Basic Research and Economic Performance* found that while identifying qualitative impacts on productivity was possible, the methodologies to quantify the effects are not well developed. This is consistent with the Parliamentary Office of S&T view that "the jury is still out on the overall effectiveness of Framework[2]" in improving Europe's industrial competitiveness.

15. In terms of *juste retour*, as evinced by BIOMED funding to UK academic groups, the UK consistently does better than any other country. For example, in the first two calls of BIOMED-II 25 per cent of successful proposals were led by UK scientists, and 78 per cent involved one or more UK partners. We would wish to see better data from the Commission on industry participation—by country and by type of industry.

16. We believe that the "concerted action" (network) form of support generally provides better value-for-money than "shared cost" funding (project grant funding that can include salaries and major research expenses). The concerted action is distinct from and complementary to national modes of funding. Duplication of national priorities and funding mechanisms must be avoided not least because it could cause governments to cut national research budgets, resulting in a shift in the S&T centre of gravity towards the Commission.

17. EU spending on Research & Technology Development (RTD) is about 3 per cent of the total spent by member states (public and private). It can be argued that this scale of activity can have rather little impact on European industrial performance. However, for the UK academic research community BIOMED and other programmes provide significant research-funding opportunities. It is worth considering that abrupt changes in policy and priorities for FP5 could have a major effect on the pattern and rate of UK participation. In this context evolution is more desirable than revolution.

PRIORITIES

Question 6. "What should be the role and priorities of the Joint Research Centre, and how should its activities be funded?"

18. The mission and programmes of the Joint Research Centre have virtually no bearing on health and biomedical research; nor is it appropriate that they should. As a principle, we see no justification for the JRC to receive most of its funding directly from the Commission, ie outside the normal competitive framework.

---

[2] *The European Union and Research—EU Framework Programmes and National Priorities*, page 49 and Section 5.

Question 7. "How should the EU meet its 'cohesion objective', while ensuring that the highest scientific standards for EU research are met?"

19. Strengthening participation of the less-favoured regions (LFRs) in Framework is a laudable objective. However, it would be self-defeating to do so at the expense of quality. Nor is it helpful to encourage a brain-drain from the LFRs to the states with stronger R&D. The priority should be on developing a strong, competitive research base in the LFRs. This should be addressed outside of the Framework Programme itself, through "structural funds."

FUNDING AND ADMINISTRATION

Question 8. "Does the European Commission have the adequate expertise and the mechanisms to support the Framework Programme?"

20. The Commission has significantly improved its management of BIOMED but there is room to do more. For example, applications are not sent to expert referees for initial assessment as in most national systems. Instead, assessors are called to Brussels for five or more days where they are isolated from their home sources of reference material. Also, the programme committee is not able to obtain the information from the Commission needed to assess whether the depth and balance of expertise is adequate. We believe this introduces avoidable weaknesses into the project selection process. There is also room for improvement in the evaluation of individual projects and programmes as a whole. Current evaluation is focused primarily on process rather than research outcomes. The research management expertise of Commission staff is generally good although variable and is at its best comparable with UK standards.

21. We remain concerned about the length of time taken from the closure of a Call to the final signing of a contract, which can be over 12 months. In addition, the Commission sometimes make large cuts (> 50 per cent) to project funding, with the effect that the science funded may differ markedly from that approved by the assessors and Programme Committee.

Question 9. "Is the current length of Framework Programmes too long and would they benefit from shorter time frames with more flexible funding? Alternatively, should the Programmes be longer?"

22. We are particularly concerned at the inability of the Framework cycle to commit support to long term studies, in particular major clinical trials. This is important because large multicentre trials have the potential to address questions of major public health and economic importance for policy makers and health-care providers across Europe (including issues that differ from the primary interests of commercial industry). The UK is particularly strong in the trials area. To capture medium-to-long term outcomes, large trials may need support for five to eight years or longer and therefore a funding commitment that spans two or more Framework Programmes.

Question 10. "Should Task Forces have ear-marked funds to support their own research programmes?"

23. No. Our view is that task forces should advise the programme management committee(s) on opportunities and needs and should not initiate research on their own account.

Question 11. "How should the UK allocate funding for the Framework Programme and other EU research initiatives to ensure that UK researchers are not disadvantaged?"

24. Government considers that attribution provides a necessary discipline for determining national priorities for Framework. We are alive to the concern that departments might be reluctant to support areas despite their potential for benefit to the UK and added European value because they wish to protect departmental spending. Fortunately, such issues have not unduly constrained the joint approach of MRC and DH to negotiating the structure and content of BIOMED-I and II, and the Council looks forward to a similar constructive approach in developing priorities for FP5.

December 1996

APPENDIX

THREE EXAMPLES OF SUCCESSFUL BIOMED COLLABORATIONS

(i) *The surveillance of Creutzfeldt Jakob Disease:* An 11 member UK-led collaboration which standardised procedures for monitoring the frequency of CJD, providing a basis for sophisticated epidemiological and molecular genetic analyses. This work underpinned the identification by UK researchers of a new variant of CJD in March this year.

(ii) *Neonatal screening for hearing disorders:* This BIOMED project involved 30 partners from 15 countries (four from UK) to produce objective, standardised tests for screening hearing ability in newborn children. The project validated the technique for application in different health services settings and helped to disseminate it through Europe. The beneficiaries are deaf children and their families, and the users include health services, clinicians, policy makers, researchers and the UK medical instrumentation sector.

(iii) *Human genome analysis:* Human genome analysis has been supported through FPs 2, 3 and 4 with the aim of providing innovative genetic tools, new genetic maps and data resources, and of underpinning European human genetics research. This is illustrated by a seven member, UK-led BIOMED collaboration which identified a gene associated with a predisposition to schizophrenia. No one country alone would have had a large enough sample of affected families to detect an association of this kind.

Memorandum by the Natural Environment Research Council

1. Background

The mission of the Natural Environment Research Council (NERC) requires it to advance knowledge, understanding and the prediction of the environment and its resources. NERC is the lead UK body for basic, strategic and applied environmental research. The NERC and its community of scientists have been involved with the Framework Programmes, both as contractors, through NERC Centres and Surveys and universities, and in policy terms as members of Framework Programme Management Committees and a range of advisory groups.

NERC submitted a memorandum on a future EC Fifth Framework Programme to the Office of Science and Technology in March 1996. A copy of this memorandum is at Appendix A (*not printed*).

The memorandum addressed a number of structural issues and confirmed a useful role for Task Forces in examining EU needs in particular areas, but expressed concerns about the way they had been set up and the areas they were addressing. NERC proposed more integration of activities two, three and four (co-operation with other countries, dissemination, and training/mobility of researchers) within the specific programmes of the first activity. NERC also sought improved linkage between the specific programmes.

The memorandum suggested that there should be an environmental aspect to much of the Programme in order to underpin EU environmental policy with a sound knowledge base, and that two specific programmes of environmental science should be included. One could be formed by incorporating "environment and health" into the current Environment and Climate Programme. The other could be a broadening of the Marine Science and Technology (MAST) Programme to allow an integrated approach to all aspects of the sustainable management of the European coastal zone and shelf seas.

The memorandum proposed an Arctic regional focus to Framework Five as a timely alternative to the Eastern Europe and Mediterranean regional themes of the recent past and noted the importance of exploitation of satellite-based earth observation data. Finally, the memorandum explored the ways that the six Environment and Natural Resource Issues, identified by NERC after wide consultation with its user community, each have European dimensions.

NERC contributed to the debate that led to the "UK Position Paper on a Fifth Framework Programme", that was submitted to Madame Cresson in June 1996, and is supportive of this document. NERC is confident that its science could address a number of the document's thematic objectives, within a specific programme based on Environmental and Marine Science and Technology.

NERC's suggestion for an illustrative example of a thematic objective, "Marine and Coastal Resources Management", was not included in the UK Position Paper because of overlap with other suggestions. Nevertheless, NERC still believes that there would be added value on a European scale in addressing the issues of coastal seas in an integrated fashion, to provide the knowledge base to allow sustainable and equitable use of all the resources of the coastal zone, from inland areas to the edge of the continental shelf.

NERC looks forward to contributing further to the UK's input to the content of the Fifth Framework Programme, and notes that the European Commission's paper "Towards the Fifth Framework Programme" describes thematic aspects that refer to "resources of the living world and the ecosystem" and to "sustainable growth".

2. Specific Questions

Lessons from the Fourth Framework Programme

The additive way in which FPIV was assembled led to a programme of research that was too comprehensive, in which chosen high priority subjects were diluted by others proposed by various factional groups. As an example, the "Grand Challenges" developed by the European Committee on Oceanographic and Polar Science survived as only a part of the MAST Programme. The Fifth Framework Programme must have a clear focus on priority topics.

There is a need for a more transparent and rigorous system of evaluating projects, which has the confidence of applicants and Programme Management Committees.

Where an area of research spans two specific programmes, there is a need for a mechanism that treats the area as a whole instead of artificially dividing responsibility for the area, for example by giving lead responsibility to one of the programmes. More effective links are needed both between sections of the Commission and between Programme Management Committees.

Should there be a Fifth Framework Programme? If so, what should be the main objectives or focus and how should the priorities be set?

NERC believes there is value in a Fifth Framework Programme, which should address EU policy and societal needs as well as promoting competitiveness in Europe. The objectives of the Programme should relate to European-scale issues, and should not be just an amalgamation of national objectives.

In the environmental area, the "European Community Fifth Action Plan in relation to the Environment and Sustainable Development" provides a policy focus to steer the required underpinning research, as described in the "UK Position Paper on a Fifth Framework Programme". Global Environmental Research provides another set of problems of a scale appropriate to a European research programme. An Arctic Environmental Programme would form a suitable European focus for this activity.

Balance between basic and applied, pre-competitive, and near-market research

These definitions do not sit easily with the EU needs for a Fifth Framework Programme. The bulk of the research should be goal-oriented, where the goals are defined by EU policy or societal/economic requirements. There is also a need for some more basic science goals to be defined to encourage the European science base to develop as a cohesive unit, that will then be well positioned to address Europe's needs in the future.

Within the natural sciences, it can be difficult to predict the benefits of basic science; this should not be used as a rationale to focus scientific effort into more applied areas in which benefits can be seen. The European Commission's paper "Towards the Fifth Framework Programme" expresses one topic as "Unlocking the Resources of the Living World and the Ecosystem". That process of unlocking must include curiosity-driven research of the highest quality, undertaken at a European scale.

What should be the role of Task Forces in a Fifth Framework Programme?

NERC recognises a useful role for Task Forces in representing the "users" of the research and in steering the specific programmes. However, the selection of subjects for the current Task Forces, their establishment, and their mode of operation were not transparent and appeared to be too closely driven by the Commission. The relationship between Task Forces and Programme Management Committees will need to be made explicit. Task Forces should not be the mechanism whereby the detailed content of programmes is defined, but they will provide guidance to Programme Management Committees. Each Task Force should be focused on one of the objectives of the Fifth Framework Programme, and should act as a proxy customer for the Programme.

Value for money from participation in the Framework Programme?

The community of UK environmental scientists has benefitted from Framework Programmes through winning a significant number of research contracts, with an income to NERC of £5.8 million in 1995–96, and high rates of UK participation in contracts to date in the Environment and Climate (63 per cent) and in the MAST (83 per cent) Programmes. NERC continues to have representation on the management committees for both of these programmes. The same community has also benefitted from increased awareness of research undertaken throughout Europe and increased willingness to interact with scientists from overseas. The research contracts have benefitted the volume of research undertaken, providing, in some cases, gearing for domestic funding, and have accelerated and added richness to the science.

The danger, that effort is being diverted away from national priorities towards European priorities, is reduced because of the strong influence that the NERC community of scientists have been able to have on the content of specific programmes of the Framework Programme. This possibility is certainly outweighed by the benefits of participation in the Programme.

Role and Priorities of the JRC

NERC supports the OST view that the function of the JRC should be kept under review, with a clear system of deliverables shown against agreed objectives. There should be a rigorous independent audit of the JRC. The JRC should not have any inside track to funding, but should compete for funds from the specific programmes, or for contracts with the Directorates General of the Commission.

EU Cohesion Objective

NERC regards cohesion is one valid objective of the Framework Programme, that is addressed by any multinational partnership, but particularly those formed between scientifically advanced and less advanced nations. Movement of scientists under the Second Activity, Training and Mobility of Researchers, is a valuable instrument for this sort of cohesion, that also has a real scientific benefit.

Expertise and Mechanisms in the European Commission

The staff of the Commission in the units responsible for specific programmes have the right expertise and are generally well-motivated and hard-working. They do labour though under imposed Commission structures and mechanisms that hinder the smooth operation of programmes. These include a bureaucratic and unresponsive system of budgetary approval, general difficulties with planning ahead, and rivalry between different Directorates General.

Length of Framework Programmes

In the environmental sciences, much work is necessarily of longer duration than the four years of a Framework Programme, and significant progress requires activity that spans two or more separate Framework Programmes. Restricting the length of Programmes is not the best mechanism to ensure accountability and flexibility to changing needs. NERC would prefer a rolling programme or separate programmes of longer duration, with alternative arrangements to ensure accountability and flexibility. As Framework is currently arranged, NERC scientists are now disseminating and exploiting work from the Third Programme, actively researching within the Fourth Programme, and are now considering the content of the Fifth Programme.

Ear-marked Funds for Task Forces

The earlier comments in response to the question about Task Forces are relevant here. NERC believes that, should Task Forces have ear-marked funds to disburse, they would need to be made accountable to the member states, and would, in effect, become another level of Programme Management Committees. The responsibility for programmes, and for their delivery of results to users, properly belongs to Programme Management Committees.

UK Allocation of Funding for Framework Programmes

NERC is content that the system of attribution of EU expenditure to Government Departments continues to be used, providing that the attribution is done on the basis of policy responsibility, and not on the basis of activities undertaken. The Research Councils were given missions that require them to be responsive to the needs of the users of their research. In doing this, NERC has identified a number of Environmental and Natural Resource Issues. NERC undertakes and commissions research that addresses these issues, but NERC clearly has no direct responsibility for the issues or for Government policy in these areas.

Extra Question: Effect of Privatisation of PSREs

The exact form of privatisation, and the accounting system used by a privatised NERC institute would affect the basis of costings used by the Commission. It is believed that transfer to commercial ownership would not alter the current basis, whereby the Commission will pay a partner in a project up to 50 per cent of the total costs of a research project. For a University, the basis is that 100 per cent of the additional costs incurred in undertaking the research can be funded. The difference lies in the funding of senior staff time, currently fundable for industrial or Institute partners. Privatisation might also affect the automatic short-listing for some opportunities that the Institutes currently enjoy. The financial planning and business operations of a commercialised Institute would affect its capacity to submit proposals for funding and the priority given to such submissions.

Supplementary memorandum by the Office of Science and Technology and appendices to original memorandum

Concerns about delays in processing applications for Framework Programme funding which occur as a result of inadequate staffing and a lack of continuity of staffing in Brussels?

As noted in its memorandum of written evidence, OST views with great concern the length and complexity of the process of application for Framework Programme funding, which places a heavy burden on potential participants. In its position paper submitted to the Commission in June 1996, the government laid strong emphasis on the need for streamlining of the application process and for improved administrative procedures generally.

The time taken to respond to applications varies considerably from one programme to another. In some areas, formal notification is given to applicants of the success or otherwise of their application within two to three months of the call closing date, while in others, they may not hear for six months or more. Similarly, the length of time taken for the process of negotiation of contracts varies considerably, ranging from two to six months. According to the Commission, the current average time taken from the call closing date to decisions on project selection is four to five months and to signature of contract up to a further four months.

As explained in OST's oral evidence on 6 November, the Commission has recently undertaken a review of programme management procedures and set out proposals for improvement in a number of areas, particularly the speed of processing of applications, the transparency of the process of evaluation of applications by independent experts and the level of over subscription. For the first of these, the Commission has set itself targets to reduce the time taken to notify applicants of the success or failure of their application to a maximum of four months (three months for SME specific measures and training fellowships) and for the contract negotiation phase to a maximum of two months. The overall time would thus be reduced to a maximum of about six months from its present level of five to nine months or more. OST considers that if achieved, these times would represent a very worthwhile improvement. We will therefore be monitoring very closely the progress made by the Commission towards their achievement.

OST's view is that delays are caused primarily by procedural and management weaknesses rather than by staff shortages. We have particular concerns about the time taken in procedural steps that add no value, and which would not be necessary if there were adequate delegation of budgetary and other powers, and about delays added through poor internal co-ordination between different parts of the Commission.

We are not in a position to comment on the adequacy of Commission staffing levels. We understand that the Committee has recently taken evidence from the Director-General of DGXII, who has overall responsibility for the Framework Programme including its management, on this point; and that he made clear that he was satisfied with the current staffing complement. This would suggest support for OST's contention that the key to increased speed and efficiency is likely to lie in introducing more appropriate and effective systems rather than in staffing issues.

Questions Originally Directed to the Treasury

Question 3: does the system of attribution lead to a distortion in the priorities of the scientific community?

OST dealt with this point in paragraph 70 of the memorandum of evidence submitted to the Committee on 14 October. We have little further to add.

The system of attributions, through which the impact of EU expenditure is taken into account in managing the UK's public expenditure, acts to ensure that departments make the most rigorous assessment of their priorities and in consequence get the maximum value from their expenditure, both domestically and in the EU. The departments and other public bodies involved in the process understand, and are able satisfactorily to work within, the system's basic rationale.

OST has no reason to believe that the system has influenced the UK scientific community's priorities inappropriately. The Framework Programmes have created new opportunities for UK researchers, which they have exploited vigorously. The evidence suggests that the research collaboration they pursue through the programme complements their own strategic priorities (see the 1993 study "Impact of European Community Policies for Research and Technological Development in the United Kingdom"). The UK research community has also sought actively to influence the shape and content of programmes at the negotiation stage, and this has contributed significantly to securing the representation of UK priorities in the framework programmes.

Question 4: has the budget of any Research Council suffered as a result of attribution?

The level of the Science Budget, and its subsequent allocation by the President of the Board of Trade to the research councils and other funded bodies, is determined in the light of the requirements of each research council and competing calls on public funds. The requirements of each research council will depend, amongst other factors, on the content and scope of any related research programmes being supported under the EU framework programme. To that extent, the EUROPES mechanism is designed to ensure that the cost of funding framework programme activities is taken fully into account in setting the budgets of the research councils.

Question 5: how much government money does each Member State spend on research?

Figures drawn from OECD sources are given in the attached table.

Question 6: what problems do fluctuating exchange rates cause to those involved in the Framework Programmes, and has any member state avoided this problem by their practice of "ring-fencing" Framework Programme funds?

The funding provided through Framework programme contracts is denominated in ecu. Accordingly, UK participants may gain or lose if the sterling/ecu rate of exchange that applies when payments are made to them is different from that applying at the time they conclude the contract. The impact of exchange rate movements is small however, and we are not aware that it has been a source of problems of any significance.

We know of no member state that ring fences framework funds in the way suggested. Participants bid competitively for funding to the Commission and successful bidders are paid directly by the Commission. No funds are allocated to Member States. There is therefore no obvious scope for ring-fencing.

18 December 1996

APPENDIX A

EU GOVERNMENT SPENDING ON R&D

	Total Govt. Spend on R&D (£M)	*Total Civil R&D (£M)*
AUSTRIA	729.4	729.4
BELGIUM	819.6	817.9
DENMARK	458.4	456.2
FINLAND	556.8	545.1
FRANCE	8759.7	5860.3
GERMANY	9958.5	9121.9
GREECE	139.0*	137.1*
IRELAND	101.5	92.5
ITALY	4360.1	4098.5
NETHERLANDS	1524.3	1471.0
PORTUGAL	375.9	369.5
SPAIN	1703.5	1522.9
SWEDEN	1212.3	983.1
UNITED KINGDOM	5576.6	3095.0

Source: OECD Main Science and Technology Indicators 1996 (1).

All figures relate to spending in 1994.

*1993 figures.

APPENDIX B

PROFILE OF EUROPEAN R&D EXPENDITURE 1984–98
(MECU AT 1992 PRICES)

Situation as at 8.05.96

Year	*1984*	*1985*	*1986*	*1987*	*1988*	*1989*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*Total*
1984–87 (FP1)	848.4	991.9	1,139.5	886.1	317.7	117.1	5.4									4,306.1
1987–91 (FP2)				237.5	987.3	1,438.4	1,770.4	1,339.0	230.9	14.6	3.8	0.2				6,022.1
1990–94 (FP3)								311.9	2,160.5	1,901.0	1,223.1	1.0				5597.5
(FP3 supplement)										147.8	725.3					873.1
1994–98(*) (FP4)											0.0	2,884.8	2,966.5	3,153.6	3,077.1	12,082.0
sub-total: Framework Programmes	848.4	991.9	1,139.5	1,123.6	1,305.0	1,555.5	1,775.8	1,650.9	2,391.4	2,063.4	1,952.2	2,886.0	2,966.5	3,153.6	3,077.1	28,880.0
APAS				62.4	68.9	80.9	125.4	177.9	308.4	433.7	553.0	2.0				1,812.6
Sprint							17.7	16.9	17.0							51.6
ECSC							19.4	18.4	17.5	17.2	16.9					89.4
80 per cent of THERMIE							39.9	124.8	128.9	137.1	140.8					571.5
R&D Totals	848.4	991.9	1,139.5	1,186.0	1,373.9	1,636.4	1,978.2	1,988.9	2,863.2	2,651.4	2,662.9	2,888.0	2,966.5	3,153.6	3,077.1	31,405.9
			5,539.7													
						8,163										
									12,145							
													1,4748			
EC Budget	41,352	40,385	46,730	48,475	52,473	49,327	49,952	59,126	61,232	66,759	63,761	74,983	79,305	83,968	86,591	
R&D per cent of total	2.1	2.5	2.4	2.4	2.6	3.3	4.0	3.4	4.7	4.0	4.2	3.9	3.9	4.1	3.9	

(*) including 6.5 per cent increase following enlargement

Source: Annual Report on the RTD Activities of the EU; European Commission doc COM(96)437 final.

APPENDIX C

UK CONTRIBUTION TO EU R&D BUDGET IN COMPARISON WITH GOVERNMENT EXPENDITURE ON S&T

£million	*1986–87*	*1987–88*	*1988–89*	*1989–90*	*1990–91*	*1991–92*	*1992–93*	*1993–94*	*1994–95*	*1995–96*	*1996–97*	*1997–98*	*1998–99*	*1999–00*
Cash														
UK contribution to EU R&D budget	95.3	109.7	129.8	172.0	207.4	189.2	253.0	285.0	314.0	387.9	390.9	386.5	426.7	450.0
Total Civil S&T (inc EU)	2,697.7	2,709.9	2,932.0	3,099.5	3,320.4	3,215.4	3,519.3	3,634.1	3,713.9	3,826.0	3,783.9	3,700.7	3,731.6	3,754.9
Total S&T (inc EU)	4,622.8	4,705.6	4,895.6	5,239.4	5,482.2	5,429.0	5,594.8	5,912.6	5,745.4	6,071.6	5,972.1	5,936.7	5,915.6	5,938.9
Real terms (100 = 1996–7)														
UK contribution to EU R&D budget	150.4	164.4	182.3	225.8	252.2	216.2	277.4	303.8	328.8	396.6	390.9	378.9	410.1	424.0
Total Civil S&T (inc EU)	4,258.3	4,061.4	4,118.7	4,069.7	4,037.4	3,674.3	3,859.2	3,873.9	3,889.3	3,912.1	3,783.9	3,628.2	3,586.7	3,538.3
Total S&T (inc EU)	7,297.1	7,052.3	6,877.0	6,879.5	6,665.9	6,203.9	6,135.2	6,302.7	6,016.8	6,208.2	5,972.1	5,820.3	5,685.9	5,596.4
EU contribution as % of Civil S&T	3.5	4.0	4.4	5.5	6.2	5.9	7.2	7.8	8.5	10.1	10.3	10.4	11.4	12.0
EU contribution as % of Total S&T	2.1	2.3	2.7	3.3	3.8	3.5	4.5	4.8	5.5	6.4	6.5	6.5	7.2	7.6

APPENDIX D

COMPARISON OF TRENDS IN UK CONTRIBUTION TO EU R&D BUDGET AND SCIENCE BUDGET

£million (Cash)	*1986–87*	*1987–88*	*1988–89*	*1989–90*	*1990–91*	*1991–92*	*1992–93*	*1993–94*	*1994–95*	*1995–96*	*1996–97*	*1997–98*	*1998–99*
UK contribution to EU R&D budget	95.3	109.7	129.8	172.0	207.4	189.2	253.0	285.0	314.0	387.9	390.9	386.5	426.7
Science Budget	595.8	650.4	697.3	803.2	889.9	914.5	1,051.3	1,163.1	1,223.1	1,299.5	1,311.4	1,330.0	1,346.0

Supplementary letter by the Office of Science and Technology

VAT AND ATTRIBUTION

It seems progress may be somewhat slower than I had hoped when I gave oral evidence on 5 November 1996. The nub of the problem lies in whether the research contractors are considered to be supplying a service or not, a point on which the Commission and HM Customs and Excise take differing views.

Customs advise that discussions with the Commission on this are continuing. At present they await written evidence from the Commission in support of their assertion that the contracts are for a service. When this information becomes available, Customs and Excise will look at the issue again. At this stage it is not possible to set a timeframe for this.

You also asked for an account of the attribution process as it affects the Research Councils, in light of Sir William Stewart's oral evidence of 11 December to the Select Committee. As explained in the written evidence submitted by OST, through the attributions process EU expenditure is brought to bear on departmental budgets through offsets to Departments' "baselines" at the beginning of each year's Public Expenditure Survey process. There is however, no automatic relationship between the potential reduction in a department's budget attributable to EU RTD expenditure and its domestic S&T programmes since the Minister can press the case for restoring potential reductions or reallocate resources from within the overall departmental budget. The allocation of funding to the Research Councils is decided by the President of the Board of Trade in the light of the Councils' requirements and competing calls on public funds. The requirements of each Research Council will depend amongst other factors, on the content and scope of any related research programmes being supported under the EU Framework Programme.

Rob Wright
Director, International S&T

21 January 1997

Supplementary memorandum by the Royal Academy of Engineering

234. *Does the Academy agree with the Royal Society that under "Training and Mobility", the current programme is unsatisfactory because the balance between the level of stipend versus the level of research support is wrong, and "At present we believe the former is too high and the latter is too low"?*

The Academy now understands that the matter of the stipend has been resolved and is now at a more realistic level. The support for research costs, however, is still far too low. The Academy therefore agrees with the statement that the level of stipend is too high and the level of research support is too low.

237. *In your written evidence you take the view that, while it is no doubt healthy for the Joint Research Centre to raise some monies through contracts, you are not keen for this to be referred too far. I am referring to page 8 of your evidence. We have received evidence from the OST who would like to see 80 per cent of funds coming through competition and indeed, other written evidence that suggested 100 per cent on the basis that the JRC is top-slicing funds and that an element of competition might be desirable. Would you like to comment on why you were so cautious about this concept?*

The Joint Research Centres have special expertise and installations directly related to the technical areas for which they were established. In Framework IV 28.2 per cent of the JRC budget was for nuclear fission safety and 32.7 per cent for environment and climate. The Academy has two concerns about the funding coming from competitive contracts. Firstly, there is a question of whether comparative facilities are available elsewhere to continue work on such long term topics, and secondly, that a massive switch away from them could leave very expensive equipment and expertise under utilised. This would not perhaps be making best use of EU funds. The Academy advocates that the 80 per cent of funding to be gained through competitive contracts, as suggested by the OST, should be a maximum figure. Too high a rate of change could prejudice application of the results received so far.

240. *Could I ask you, as representatives of the Royal Academy of Engineering, which I believe to be a member of the European Science Foundation and which I expect has nominated members for the European Science and Technology Assembly, whether you are happy with the bodies which have been set up to advise the European Commission on the nature of its scientific and industrial programmes and whether you think they are effective?*

The Academy is not actually a member of the European Science Foundation. It is, however, a member of the European Council of Applied Sciences and Engineering (Euro-CASE). This organisation was set up by the academies of engineering in Europe and is independent of the Commission. Much, but not all of its work is directed towards the Commission and the constituent nations of the union. It meets frequently and has an active secretariat which ensures continuity. The Academy believes that Euro-CASE has an important role to play in providing advice in Europe.

The European Science and Technology Assembly (ESTA) was set up with 100 members drawn from academia and bodies such as IRDAC, EIRMA, CODEST and Euro-CASE. ESTA is a large unwieldy body which in the early stages was dominated by academics. A number of working parties have been assembled which have produced reports of varying quality. The secretariat provided by the Commission has worked hard to make things happen, but most members seem to feel that the working process is complicated and tedious. ESTA is an expensive organisation and its effectiveness in advising the Commission is questionable. Considerable room for improvement exists.

18 December 1996

Memorandum by the Royal Society

Attached is a submission of the Royal Society on the European Union Fifth Framework Programme. It was prepared in response to a request from the European Science Foundation for the views of their member organisations and should be of interest to all those with an interest in European RTD.

This submission was prepared by an ad hoc group of Fellows chaired by Dr J Tooze. The other members were Professor P Day, Professor J C R Hunt, Dr C Jordan, Professor M J Kelly, Professor C J Leaver, Professor J E Midwinter, Dr R M Moor and Sir Peter Swinnerton-Dyer. The submission has been endorsed by the Council of the Royal Society.

INTRODUCTION

We are grateful for the opportunity to contribute to the formulation of the EU's Fifth Framework Programme (FP5). We offer general comments and then more specific views under the following heads:

- Importance of Basic Research
- Infrastructure
- Programme Management
- Cohesion and Excellence
- Training and Mobility

We have listed and commented on a number of priority areas for FP5 in a separate annex (A attached).

(i) *General*

The goals of EU RTD are to increase the global competitiveness of European industry; improve the quality of life for Europeans and inform EU policy development. Most scientific research is sponsored nationally, and should remain so unless there is a clear scientific or economic benefit in doing otherwise.

EU support should be given only to RTD that cannot or is not being done nationally (eg because of cost or scale or because benefits are transnational). We support the concept of trans-European research primarily because it guarantees collaboration across Europe, promotes networking and cross-fertilisation of ideas between organisations and nationals of different Member States and enhances cohesion. These benefits to RTD will strengthen the Union's ability to compete in the global economy. It is, however, clear that benefits will accrue only from the support of scientific and technological excellence in both research and training.

(ii) *Importance of Basic Research*

If basic research is starved of support productive applied research will wither within a decade. As basic research becomes more sophisticated and expensive there is a tendency for support to be less forthcoming for those branches of basic science with unpredictable or, at best, long-term returns on investment.

The EU should not lose sight of the fact that the applied research of today would not be possible if basic science had not provided the foundations in the past. We are in no doubt basic science will do so in the future.

Consequently, it is essential that basic science is supported to a greater extent in FP5 than it has been in FP4. Significantly more funding should be made available for basic science from programmes other than Training and Mobility for Researchers (TMR). To achieve this each RTD programme should have within it an amount earmarked for underpinning basic research in the broad area of that programme. We suggest that these funds should be granted in responsive mode within that programme and should constitute not less than 10 per cent of the programme budget. Such a sum would be an investment for the future competitiveness of Europe and its long-term prosperity.

(iii) *Comments on the Infrastructure*

Every European nation has gaps in its portfolio of scientific research. If the EU is to remain competitive in the global market there should be no significant areas of research that are absent from Europe as a whole. There is therefore a need to identify present gaps in European scientific expertise, and where gaps are likely to emerge in the near future. FP5 should have the capacity to plug these gaps as they are identified.

We recommend that a proportion of the TMR budget be set aside for specialised training and mobility in the gap areas. This funding would be used to import scientific expertise from leading-edge establishments outside Europe either by inviting individuals to work with interested parties in Europe or to fund Fellowships for Europeans to work elsewhere. For the former there would have to be sufficient inducement to attract appropriate experts, and for the latter the Fellowships would have to be structured in such a way that Fellows would bring expertise and knowledge back to EU scientific establishments—3 years outside Europe followed by a minimum of two years within the EU might be appropriate.

For historical reasons and because of the emphasis on national RTD there is overlap of nationally funded research activity among the Member States of the EU. In particular we would like to see greater coordination of the provision of major facilities in Europe, and greater dialogue between the various national funders of RTD. The ESF and DGXII have both begun to encourage coordination but much more needs to be done.

Research infrastructure should be funded so as to provide facilities that are beyond the resources of individual Member States so that research may be undertaken that otherwise would not be funded in Europe. Examples of such facilities are neutron sources, and earth observing satellites for purposes such as oceanography and agriculture. In major research areas there is a need for more division of labour between national research groups and institutions. Areas where this has been achieved, for example, are the EU sponsored sequencing of yeast chromosomes and comparative genome mapping. The creation of European facilities and coordinated programmes of research allows Europe to participate in big science in a cost-effective way.

(iv) *Programme Management*

It is imperative that the best European scientists participate in the Framework programmes. To ensure this, projects must be selected primarily on the quality of science rather than on other criteria. Methods of achieving this without compromising the goal of improving the science in all EU Member States are addressed in the next section. In addition to the current use of a variety of criteria for project evaluation, we also consider that unnecessary bureaucracy and a lack of confidence in the process of selecting and monitoring of programmes militates against participation of some leading European scientists. We congratulate the Commission on its current progress in improving the selection procedures and urge that all decision-making processes be made transparent. This should include the publication of names of panel members and the presence of independent observers at panel meetings. Secrecy does not engender confidence within the scientific community and is not required to protect panel members from lobbyists. We strongly endorse the ESTA proposal that independent observers should attend panel meetings and suggest that relevant European wide societies and groups should be invited to supply observers on a rotational basis. (This would send a strong and much needed signal of support to such groups from the EC).

Although the Commission currently carries out virtually all programme management, it cannot be expected to be sufficiently competent in all the scientific areas addressed by Framework Programmes. The Commission should consider contracting out specific programmes or aspects of them (such as project selection or review of collaboration programmes), but should do so only where there are clear advantages and where an independent pan-Europe group, expert enough to take on the role, is available.

It is important that each programme should have an open, rigorous and obligatory mid-term review; they do not always take place. These mid-term reviews should go to an appropriate body such as ESTA for comment; this process would be a key factor in the design of the following Framework Programme. In particular, the audit of mature programmes should comment on whether and how the programme should continue, whether it overlaps with activities in other Directorates, and whether other Directorates make use of its results.

We recommend that the Commission should demonstrate greater transparency in decision making; and through rigorous, regular review should seek to harmonise Framework activities with the programmes of other Directorates. It should further initiate a policy of contracting out programme management where there is clear benefit in doing so.

(v) *Cohesion and Excellence*

An important goal of the EU, to enhance the scientific capacity of the less scientifically advanced European nations is laudable and we strongly support it. However, we believe that achieving both this objective and scientific excellence requires modifications to existing procedures. The simple inclusion of partners from less scientifically advanced countries is not the most effective way to improve standards across the EU. Indeed, it has sometimes led to poorer science being funded ahead of better proposals, to a reduction in confidence amongst the scientific community and to uneven partnerships which do not sufficiently benefit the less scientifically advanced nations.

For the EU to be globally competitive it must exploit its strengths and, therefore, fund its best science. In the interest of cohesion it must also build and sustain scientific capacity within all its Member States. The two are not incompatible and we would recommend the following to achieve them both. An element of funding should be attached to each Framework grant to provide Fellowships. These Fellowships would be filled by open competition but with the following constraints. First, the prime aim of the "Framework Training Fellowship" will be to further cohesion and thus should *not* be available to individuals of nations already represented in the grant holding consortium. Second, these Fellowships would be so structured and funded that the holder would be able to work with the partnership initially and then return to his/her Member State with funding for a start-up period in which to become re-established. We suggest that this approach will be cost-effective and a highly effective means of building scientific capacity in all Member States.

We recommend that Framework projects should be selected solely on scientific merit. Attached Framework Training Fellowships will provide training to less scientifically advanced nations.

(vi) *Training and Mobility*

We view international exchange through training and Fellowships as cost effective; it should both enhance cohesion and help plug gaps in the EU coverage of science. But the current TMR programme is unsatisfactory in its details, particularly in the balance between the level of stipend versus the level of research support for Fellows. At present we believe the former is too high and the latter too low. There should be a review of the way in which TMR works, designed to better achieve greater cohesion and coverage of science.

27 October 1995

Annex A

PRIORITY AREAS FOR FP5

This list is neither exhaustive nor comprehensive but represents some areas that it would be timely to develop.

Working Group members have considered the question of priority areas for future European RTD; they have consulted colleagues, and have taken note of the trends in FP4 and in pan-European and global issues, and of the recommendations of the UK Technology Foresight exercise, before arriving at the following suggestions.

(a) *Climate and environmental issues* which clearly transcend national boundaries (often involving large expenditure on facilities that could not be supported nationally). The time is also ripe for consideration of climate impact and forward planning in particular for the adverse consequences for Europe of long-term climate change.

(b) *Clean Technology and Bioremediation (or "Clean-Up" Technology).* The development of cleaner technologies for industrial and agricultural processes and practices has already shown itself to be cost effective; and the development of plant and microbe-based technology to clean up the environment and minimise the deleterious environmental consequences of industrial and agricultural activity is set to become a major source of wealth creating technology. There is a danger that this will be dominated by the USA.

(c) *Ageing and Senescence in Humans, Animals and Plants.* All European countries face the challenge of ageing populations. A multidisciplinary programme of research focusing on the biomedical and socioeconomic aspects of ageing in individuals and populations with special reference to improving the quality of life rather than prolonging life expectancy. A particular focus would be on the biology of progressive degenerative diseases associated with ageing. Basic research into the molecular mechanisms of ageing should include comparative studies in humans, animals and plants.

(d) *Telematics, Data Access and Transfer*

As telematics is becoming an increasingly pervasive enabling technology, the current telematics programme should be reassessed and some elements redistributed to relevant Directorates. The telematics within FP5 should be refocused to develop solutions to the organization of the ever-expanding volume of published material and scientific information to produce efficient, standardised, telematics for European information management. The EU should promote Europe-wide electronic access to national data collections, including libraries. This would greatly facilitate cohesion.

(e) *Materials*

To include the science of new materials and their development for a wide variety of purposes throughout European industry, for example, in the chemical industry, for the synthesis, processing and structure-property relationships of polymeric materials; weight saving and high temperature materials for new vehicular construction and safety; biomaterials for medical and agricultural purposes; and thin film materials for photovoltaic power generation.

(f) *Energy*

Improving thermal efficiency in power generation and reducing the environmental burden of energy production. Encouraging the science of energy storage, to include both electrochemical methods (batteries; fuel cells) and novel methods of megastorage to balance load factors, and continue improving non-hydrocarbon routes to energy production.

Memorandum by the Royal Society of Chemistry

On behalf of the Royal Society of Chemistry I enclose our submission to the inquiry currently being conducted by Sub-Committee I into the Framework Programme and European Research.

Although I am mindful of the questions in which the Sub-Committee is likely to take a particular interest, this Society submission provides two contrasting, but I hope complementary, ways of looking at the importance of the Framework Programme.

- The first submission provides a focus inwards on the human dimension of Framework Programmes, as seen through the eyes of someone with great experience of how they operate.
- The second submission provides a focus outwards to the broad picture, by formally presenting a document designed to promote awareness of the importance of chemistry in the context of discussion about the Fifth Framework Programme.

Stephen Benn,
Parliamentary Affairs Officer

6 December 1996

This submission by the Royal Society of Chemistry is in two parts and a summary of each is given below:

Personal Observations on the Framework Programmes

I enclose a submission from Professor Jon McCleverty, Professor of Inorganic Chemistry in the School of Chemistry of Bristol University, who is not only a senior member of the Society with 30 years of experience but someone who has not only been personally involved with the current (Fourth) Framework Programme and the previous (Third) Framework Programme—both as an evaluator and as a researcher—but is also engaged in discussions about the Fifth Framework Programme. I hope you will find his comments of value.

Chemistry: Europe and the Future (not printed)

On behalf of the Royal Society of Chemistry I am pleased formally to present to the Sub-Committee the document entitled Chemistry: Europe and the Future. This has been produced by a Europe-wide group called the Alliance for Chemical Sciences and Technologies in Europe [AllChemE].

The Royal Society of Chemistry, via its membership of the European Communities Chemistry Council and Federation of European Chemical Societies, played a leading part in producing this AllChemE document. It is specifically designed to raise awareness of the importance of chemistry and its key role in the economies of the UK and other Member States—not only with the Commission but more widely throughout Europe—at a time when the Fifth Framework Programme is under active discussion.

The Framework Programmes: Training and Mobility in Research [TMR]; Human Capital and Mobility [HCM]

As a senior Council Member of the Royal Society of Chemistry, with a good deal of personal experience of Framework Programmes stretching back over many years, I hope it will be helpful to Members of Sub-Committee I of the Select Committee if I put on paper a few key points concerning the operation of the current programmes within the Training and Mobility for Researchers (TMR) programme of the Framework Programmes within the European Union.

POSITIVE POINTS ABOUT FRAMEWORK PROGRAMMES

(i) The human mobility of our research workers would have happened anyway, but sporadically and not to the extent that has been possible under the Framework Programme.

(ii) The quality of research training is uniformly high.

(iii) The UK has benefitted substantially, partly because young researchers want to learn English as well as study here, and the UK has probably gained more as a host country than one would have expected in terms of the UK's size and level of scientific activity.

(iv) Personally, Framework Programmes have enabled me to collaborate across Europe in a way that would not have been possible using UK resources alone.

CRITICAL POINTS ABOUT FRAMEWORK PROGRAMMES

(i) The "success rate" of applications is far too low. Either too little money is being apportioned; too many applications are being made; or too much money is being allocated to each successful application.

(ii) The feedback to unsuccessful applicants is extremely unsatisfactory and the Commission is unnecessarily secretive about explaining why applications have failed.

(iii) The Framework Programmes are too unfocused and could benefit from clear planning guidelines (analogous to those operated by the EPSRC in the UK) which would indicate areas where Europe needs to improve training and competitiveness both in research and industrial terms.

PERSONAL INVOLVEMENT IN FRAMEWORK PROGRAMMES

I currently serve on the Evaluation Panel for the Chemistry Programme of the Training and Mobility in Research [TMR] Network proposals within the present (fourth) Framework Programme.

I also served as a chemistry evaluator on both Network Programmes and Fellowship Programmes within the third Framework Programme.

My overall view is that these manifestations of the Human Capital and Mobility [HCM] Programmes within the European Union are excellent, and have very substantially added to the quality of both European chemistry and British chemistry.

SUMMARY OF KEY POSITIVE POINTS

There are four major positive points I would like to make:

(i) *The Mobility of Young Research Workers*

While the mobility of young research workers between laboratories within the European Union could have happened in the absence of the TMR programmes, it would only have been sporadically and certainly not in the volume which has occurred during the last four years.

(ii) *The Quality of Training*

The quality of training, so far as I can tell as an evaluator in chemistry, is uniformly high. The evidence can be found in the reputation of the laboratories young researchers are visiting, the reputation of the principal investigators, and the quality of the published work emanating from these laboratories.

(iii) *Benefits to the UK*

The UK has benefited substantially from the mobility programmes, arguably gaining more as a host country than one would have expected in terms of the UK's size and level of scientific activity. The UK benefits from a natural advantage in terms of our native language: many TMR Programme participants want their young researchers to gain expertise in the English language as well as in research (but not in the United States).

(iv) *The Potential For Collaboration*

From a personal viewpoint, I have been able to establish collaborations, of an interdisciplinary kind, with more colleagues in the best laboratories in Europe than would have been possible through UK resourcing alone (either via the Research Councils, the British Council or other sponsors). This is one of the most important and successful aspects of the Networking programmes.

THE ADMINISTRATION OF FRAMEWORK PROGRAMMES

My experience of the administrative aspects of the Framework Programmes leads me to make a number of criticisms of the system. I make these criticisms in the light of my experiences both as an evaluator, and also as a participating scientist in two Networks: one established in the third Framework Programme, and one just beginning within the fourth Framework TMR Programmes.

The Finance Available to a Successful Application

At the moment, successful applications can typically involve eight laboratories in at least three countries in the European Union. [There are precise guidelines as to what constitutes a viable Network.] These applications are allocated the full cost (under local salary/pension/national insurance conditions) of one or two postdoctoral researchers, together with realistic operational costs for the work to be done (mainly consumable chemicals), travel money to the facility concerned, mobility between the laboratories of the Network, and an institutional overhead. This can mean awards of ca 1.3 million ECU per Network.

The natural result of this is that relatively few Networks are resourced. In the last round, there were about 260 applications, and I think only 17 were successful (only a 7 per cent success rate!).

The Evaluation Procedure

The evaluation procedure is reasonable. Applications are apportioned between the 30 Panel Members, who are nominated by the Member countries of the Union through various mechanisms. The selection of reviewers is done mainly by officials in the Brussels office, according to keywords in each Panel Member's dossier, although some advice is sought from a small group of Panel Members acting as de facto advisers. The time to carry out the evaluation is reasonable (about one month), and there is an opportunity to consult more widely, but strictly confidentially, with other experts outside the Panel. [The main problem here is the time factor: extremely wide consultation takes too long.]

The results of the evaluations, based on a numerical score largely related to quality factors (such as the proposal, the host institution, the chief investigator), is made in Brussels, and the Panel meets over two days to prioritise the results.

SUMMARY OF KEY CRITICAL POINTS

There are a number of problems and criticisms of the system to which I would like to draw your attention:

(i) *The Low "Success Rate" of Applications*

The success rate in obtaining funding for Network applications is far too low. This acts as a positive disincentive to good scientists to make applications. This low "success rate" can be interpreted in three ways:

- (a) Too little money is apportioned by the Commission planners to the exercise. This point is unlikely to attract much sympathy in the Commission.
- (b) Too many applicants are overloading the system. There is no clear decisive thinking about how to reduce the numbers, and to do so would probably be unacceptable to the scientific community.
- (c) Too much money is being allocated to successful applications. Here something can be done. For example, perhaps funding should cover travel/subsistence money only and perhaps a small award for consumables. By contrast, if salaries were not covered, the spirit of the Programmes would be preserved and the doctoral programmes of the Member countries could be enhanced by encouraging mobility for up to six months as a required part of the research training.

(ii) *Poor Feedback to Unsuccessful Applicants*

Feedback to unsuccessful applicants is extremely unsatisfactory, and the Commission seems unnecessarily protective of the anonymity of the evaluation panel. This feedback is essential in order to help unsuccessful applicants to understand why their application failed, and help them to improve their subsequent applications.

(iii) *A Lack of Focus in Framework Programmes*

The programmes are too unfocussed. The Commission seems to be following a "bottom-up" approach to applications. There is no policy as to which types of chemistry are to receive preferential treatment for funding. I recognise that this is a controversial criticism, but in the UK clear planning guidelines have been in existence within the SERC and now the EPSRC for a very long time. It should be possible for the Research Council Chemistry Committees of the EU Member States to declare their own strengths and weaknesses, their own national priorities, and to contribute to the strengthening of the Human Capital and Mobility (HCM) Programme by encouraging the Commission to promote areas where Europe needs additional support to improve training and competitiveness in both research and industrial terms.

CONCLUSION

From my point of view, I have found that sitting with the Panel Members discussing the merits of 260 applications—of which at least 200 have been really top quality—and trying to reach a reasonable ranking, has been hugely frustrating.

It is almost impossible to decide, given the lack of scientific priorities. One might as well put the names in a hat and make a lottery draw—the results would probably be just as fair!

There must be some defensible alternative that can be devised, and there must also be a greater transparency in the evaluation processes and results.

I hope these comments are useful in giving an inside view of how the Framework Programmes operate from the point of view of someone like myself, both an active researcher as well as an evaluator.

The principle that lies behind these Framework Programmes is excellent. The results—in terms of achieving high mobility, technology transfer within the research area, and of enhancing British chemistry—are extremely successful. There is, however, room for significant improvement.

Professor Jon McCleverty
School of Chemistry, University of Bristol

Memorandum by the Treasury

Commissioner Ruberti's evidence

1. The Treasury does not agree with the implication in Commissioner Ruberti's comment that other Member States regard expenditure from the Community Budget on research as purely additional to such expenditure in national Budgets. In the Treasury's experience, particularly in recent years, other Member States are keenly aware of the fact that any expenditure from the Community Budget is as much public expenditure as expenditure from national Budgets, and has to be paid for by taxpayers. Hence among other things the refusal by the Council to agree revision of the Financial Perspectives this year.

2. It is true that national budgetary procedures in the UK take account of developments in Community spending in the decision-making process on national spending. This reflects the fact that increases in public expenditure through the Community Budget have to be financed either by increases in national taxation or by reductions in national expenditure.[3] This is the case whether such Community expenditure takes place in the United Kingdom or elsewhere. The procedure which applies to research (and other "internal" Community spending) in the UK is known as "Europes".

3. In brief, Europes automatically adjusts the baselines of the Department responsible for relevant Community spending programmes to reflect increases (or reductions) in those programmes. Ministers then take decisions on the relevant national programmes in the light of developments in relevant Community spending programmes as well as of all other relevant considerations (the relevant national programmes are at Departmental level, not specifically confined to R&D/Science and Technology spending). This can and often does involve restoring part or all of the initial baseline adjustment, depending on Ministers' decisions on priorities. Europes should therefore be seen as a tool which assists Ministers in taking informed decisions about the distribution of public expenditure rather than as an automatic mechanism to reduce expenditure from the national Budget.

4. The Treasury's understanding is that other Member States also regard developments in Community spending programmes as relevant to decisions on related national programmes. They do so for exactly the same reasons as the UK, namely the need to ensure that growth in Community spending does not lead to an unplanned increase in total public expenditure, and with a view to achieving optimal distribution decisions and value for money from national and Community expenditure taken together. However, each Member State has its individual legal, political and administrative mechanisms for determining the national Budget. So far as the Treasury knows no other Member State routinely uses mechanisms for this purpose which are quite as formalised as those of the UK.

Parliamentary monitoring of the Treasury's handling of Framework funds

5. As explained above, the Europes attribution procedure forms an integral part of the workings of the Public Expenditure Survey which are internal to Government. The consequences of the Europes mechanism on the distribution of public expenditure through the national Budget are only one of the factors which Ministers take into account in reaching their decisions.

---

[3] In economic terms, the UK's net contribution to the EC Budget can be broken down into four main components.
- resource transfers to countries outside the Community (via the EC Aid budget);
- resource transfers to those Member States which are net recipients from the Community budget;
- UK's share of the central running costs of the Community institutions;
- direct transfers to the UK private sector via the EC Budget, much of which is expenditure on research. In other words, Community expenditure in the UK on research can be regarded as financed by the UK taxpayer through the UK net contribution to the EC Budget.

Memorandum by the University of Edinburgh

EXECUTIVE SUMMARY

The Framework Programmes (FP) provide increased opportunities for:

Researchers to apply for research funding: and

Industry to exploit new technologies.

The United Kingdom derives value for money from its participation in the FP by getting more money from the FP than it contributes, but it is vital that the UK financial contributions are treated as additional research funds and not as alternatives to providing funding for national research budgets/programmes.

FP research priorities are determined by the Member States who consult widely within their research communities. There is a role for the Joint Research Centres and the Task Forces to contribute to the establishment of FP research priorities, but they also have a role in monitoring progress towards achieving these priorities. The duration of the FP is probably effective given the nature of the approval processes, but there needs to be flexibility built into each research programme to ensure that goals and objectives can be revised to meet new requirements that may arise throughout the duration of the FP.

One of the deficiencies of FPIV was the lack of funds for Basic Research which are vital to the health of the European science community. There are major areas of new science and technologies where there is a clear need for more Basic Research and it is important that future FPs make adequate provisions.

Although the administration of the FP by the European Commission has improved in FPIV, there are several practical issues that could be addressed to improve their effectiveness such as greater use of electronic information systems and standardisation of documentation. The UK Government could assist the continued high participation of UK Universities in the FP by addressing the growing problem of VAT recovery on EC funded projects where the EC claim that they are exempt from paying VAT (and are now refusing to pay), but the Government does not allow these projects to be VAT-exempt, leaving Universities to carry the costs themselves. This is a situation that cannot be allowed to continue.

1. *Lessons derived from the Fourth Framework Programme (FPIV)*

The Fourth Framework Programme reshaped Europe's research priorities and saw the introduction of new programmes in Transport Research and Socio-Economic Research (although the latter was limited in its scope). There was a move towards more large-scale, multi-partner projects in several programmes although it is perhaps too early to decide if this approach produces significant benefits.

It could be argued that there are still too many individual research programmes with 15 in Activity 1, three separate initiatives in Activity 2 and four areas of Activity 4—Training and Mobility of Researchers.

The introduction of set call and closing dates for proposals of on, or around, the 15th of March, June, September and December of each year was an interesting development although this can lead to problems of congestion as many programmes have proposals arriving at the same times. (In addition, some programmes have ignored these dates and set their own deadlines.)

There are several practical changes that should be implemented in Framework V.

- There should be more provision for basic research in Framework V. Without adequate provision for basic research, all other research outputs will suffer.
- The approval process for the FP should have fixed deadlines to avoid the significant delays experienced in FPIV when critical funding for many laboratories was not forthcoming.
- Although the European Commission (EC) have made good progress in improving their administrative systems, they could go further by:
  - (i) increasing the use of electronic systems for the dissemination of information and the submission of proposals.
  - (ii) introducing a two-stage approval process for projects. The first stage would be to submit outline proposals where inappropriate projects could be removed whilst further guidance could be given to those selected for further consideration. This would have the benefits of improving the selection process and reducing costs (saving in time and effort in submitting, reviewing and selecting proposals).
  - (iii) introduce a time-limit for the proposal approval process (we are still experiencing delays of up to nine months between submitting proposals and commencing work).
  - (iv) improving the feedback of information to both successful and unsuccessful proposers.

2. *Should there be a Fifth Framework Programme?*

Framework Programmes provide essential research opportunities for UK research organisations through collaborative projects and provide increased opportunities for industrial organisations to exploit new technologies. It would be to the detriment of the UK Science base if there was no Fifth Framework Programme.

Objectives—The ultimate objective of the Framework Programme would be to increase the quality of life for European citizens through the following:

- improvement in European industrial competitiveness through the development of leading-edge technologies and a commitment from European industry to exploit the new products and processes that are produced as a result of FP projects (and thus address issues such as job creation);
- to address the whole subject area of sustainable development from climate change through renewable energies to recycling technologies;
- to improve health care systems/technologies through increased collaborative medical research;
- to facilitate European cohesion by facilitating the involvement of "less-advantaged" regions in Framework.

Priorities will always be established through discussions by all Member States so it is important that all interested parties in each Member State are given the opportunity to contribute to the debate. The UK Government have consulted widely on the UK input to Framework V and this development is welcomed. Priorities for Member States should only be established after such consultation has taken place.

3. *Framework V Research Balance*

The Framework Programme should continue to focus on pre-competitive research which is likely to attract industrial participants and encourage exploitation, but there should also be adequate provision for basic research.

It could be argued that one of the failings of Framework IV is the lack of opportunities for basic research. Some industrial sectors may argue that this is no bad thing considering that one of the main objectives of the programme is to improve competitiveness, but it is important to realise the value of basic research to the long-term good of the whole European science community. There are major areas of new science and technologies where there is a clear need for more basic research (such as some of the areas identified in the UK Technology Foresight Programme) and the European Commission have recognised this in their own paper on Framework V.

4. *Role of the Task Forces*

To some observers, the Task Forces have only received a lukewarm welcome by the Member States who have spent many months discussing their funding profile.

The Task Forces could, however, have a significant role to play in developing research priorities for appropriate programmes in Framework V as well as helping with the assessment and evaluation of relevant proposals. The Task Forces could also carry out a monitoring function to make sure that these projects exploit the technologies in an efficient manner.

5. *UK Value*

On the simple calculation that the UK gets more out of the Framework Programme than it puts in, there is clear evidence that the UK gets value for money from its participation in the Framework Programme. Many UK organisations have achieved great success in securing research funds with resulting increased employment and upgrading of equipment levels. At the University of Edinburgh, European funding now equates to nine per cent of the total research income (up from less than five per cent seven years ago), and important contracts have been won from the European Commission to allow extensive research collaboration eg The Edinburgh Parallel Computing Centre has received funding under the Large-Scale Facilities Programme to allow greater access by European researchers to the significant computing resource at Edinburgh thus providing increased opportunities for further effective collaboration.

It can also be argued that EC research projects can help remove social and cultural barriers to effective collaborations between organisations throughout Europe.

6. *Role of Joint Research Centres*

The role of Joint Research Centres (JRCs) is one of many key issues that need to be addressed in Framework V. Their funding is currently top-sliced from the Framework budget and they are also allowed to participate in Framework projects. There is a strong argument that the JRCs should have to compete for collaborative research funds in common with other research agencies. The role of the JRCs could be brought more into line with the changed priorities of the Task Forces with clear objectives and goals being set and met.

7. *Cohesion Objectives*

A careful balance has to be made between encouraging and facilitating the participation of SMEs and "less-favoured" Member States and the overall objective of funding the highest quality of scientific research.

The Fourth Framework Programme included some important measures that should be developed in Framework V.

- The introduction of a two-stage evaluation process for SMEs could be expanded to cover all programmes.
- Continued funding of the Large-Scale Facilities Programme is important because it allows scientists from "less-favoured" States (and other Member States) to use technologies and equipment that are not available to them in their own States. This can improve their scientific knowledge and possibly lead to further collaboration. The EC could perhaps develop this to allow priority access to these facilities by SMEs.
- The EC could improve the availability of research results to enable "less-favoured" States to benefit from research projects that have been/are being carried out. The separation of the Dissemination/Exploitation activity into a separate programme activity (Activity III of Framework IV) was a positive step in this direction, although the positive results of such a move are not evident (accepting that Framework IV is still relatively "young").

8. *Expertise of the European Commission*

The European Commission has greatly improved its administration of FPIV in comparison with earlier Framework Programmes and can be considered quite expert, although there are marked differences in the capabilities of the staff in different programmes.

There is still room for further development:

- The increased use of WWW has improved the dissemination of information, but greater use should be made of the facilities available.
- There is still frequent turnover of staff in certain programmes that causes discontinuity and possible delays. The BIOMED project team is staffed by Health professionals and in the experience of the University of Edinburgh, works very well and could be used as a model for other programmes who may perhaps have more "bureaucrats" on their staff.
- The EC rely heavily on external evaluators and whereas this is seen as a good way of assessing proposals, the timescales they are given to do their evaluations are very short and can lead to insufficient review of certain proposals. This is ultimately a waste of time and resources. Evaluators are given a clear set of criteria to evaluate proposals, although there are, unavoidably, also political elements involved in the decision process. It can be argued that the EC should fund the best research proposals regardless of the political make-up of the participants.

The EC should introduce common styles of documentation for all of the programmes in FPV. In FPIV, most programmes administered by DGXII have a common style of information package, but there are differences in the application material. The programmes administered by DG III and XIII have different styles of information package and application material, but there are no obvious reasons why such differences are necessary. Common styles of documentation would reduce delays and wastage of resources.

9. *Duration of the Framework Programme*

The Framework Programmes last for five years but the available time for projects can be shortened by delays in the approval process. The EC currently allows flexibility in their research objectives with several programmes producing updated editions of their work-programmes to meet new research requirements. It is important that the Framework Programme remains dynamic and subject to reviews and additions to meet new research priorities (eg the recent upgrading of CJD/BSE research within BIOMED). There is a clear role here for the Task Forces and the JRC to determine these new research priorities and encourage their incorporation in revised work-programmes which could easily be updated via WWW.

10. *Task Force Funds*

The Task Forces should not have funds to support their own research programmes as this will only dilute the amount of funding available for open competition within the Framework Programme. The Task Forces should be involved in establishing and reviewing research priorities in their respective areas, and should ensure that the products of such research are exploited.

11. *Allocation of UK Funds*

The Framework Programme is meant to be additional to individual Member States' research budgets. It is therefore imperative that the UK Government does not cut existing research budgets (eg to Research Councils) in order to meet Framework contributions as this defeats the purpose of the exercise and puts UK researchers at a disadvantage (ie they have to compete for Framework funds with researchers throughout the whole of Europe). This type of action would reduce UK success in securing EC research funding.

To ensure that UK researchers are not disadvantaged, the UK must ensure that the UK contribution to the Framework is truly additional to the national research budgets, and should align national research priorities to those agreed for the Framework Programme.

The UK Government could significantly help all UK participants in the Framework Programmes if they allowed the EC sponsored projects to be exempt from VAT. Universities, in particular, are currently experiencing significant problems when they submit cost statements as the EC are refusing to pay VAT (claiming that they are exempt). This means that the universities are having to carry the costs themselves and this intolerable situation must be resolved in the near future otherwise universities could incur significant deficits on projects and UK participation in the Framework Programmes will decline as a result.

Letter from the University of Leeds

1. We feel that most of the issues to be considered by the House of Lords Sub-Committee of direct relevance to the higher education sector are usefully addressed by the earlier position statement on Framework 5 prepared by the CVCP.

2. The main area being considered by the House of Lords' enquiry not previously addressed by the CVCP is that of the role of the Task Forces.

3. We note that the issue of the role of the Task Forces is addressed, albeit tangentially, in the OST's position paper on Framework 5, in the context of OST's proposed advisory groups for thematic objectives, which might draw on Task Force experience as appropriate.

4. Our own view is that the Task Force approach so far seems to have been reasonably useful in providing a technology watch function in specific areas, and in identifying problems underlying specific technology bottlenecks. This is a useful practical focus at this stage of Framework 5 forward planning.

5. The Task Forces have also been asked to improve co-ordination in the identified target areas across different Community research programmes (thus across different programme units and Directorates-General) and between Community and national R&D programmes. In general, we support this emphasis on better horizontal integration. The Commission's overall research efforts continue to be hampered on occasion by internal lines of demarcation. As regards co-ordination with national R&D programmes, there is of course a significant degree of overlap between Foresight and Framework priorities. It will be important to ensure that work done at national and European levels is genuinely complementary. In this respect, the Task Forces *may* have a useful role to play in improving ongoing information channels between the Commission and national funding bodies, but further clarification of the precise role envisaged would be welcomed.

6. We welcome the fact that the OST's proposals on thematic objectives for Framework 5 (informed by Foresight) are significantly wider in range and scope than the existing Task Force areas.

7. Given that the work of the Task Forces to date is likely to inform Framework 5 programme formulation, we would stress the continued need for the outcomes of the work of the Task Forces to be made as accessible and transparent as possible to all potential user groups.

Professor Anthony D May
Pro-Vice-Chancellor

28 October 1996

Working Paper by the European Commission

TOWARDS THE 5TH FRAMEWORK PROGRAMME: SCIENTIFIC AND TECHNOLOGICAL OBJECTIVES

CONTENTS

Introduction

The criteria for selecting the objectives and areas

The programmes: content and objectives

1. Organisation and content
2. The scientific and technological objectives
   - "Unlocking the resources of the living world and the ecosystem"
   - "Creating a user-friendly Information Society"
   - "Promoting competitive and sustainable growth"
   - "Confirming the international role of European research"
   - "Innovation and participation of SMEs"
   - "Improving human potential"

The programmes: implementation and legal aspects

1. Implementation
   - Two major objectives: co-ordination and flexibility
   - Instruments
2. Legal aspects

The programmes: management

Conclusions

INTRODUCTION

This second Working Paper on the 5th Framework Programme for Research and Technological Development is intended to pave the way for a new stage in the preparation of the Framework Programme.

The Communication "Inventing Tomorrow" dated 10 July 1996 set out the broad guidelines proposed for the 5th Framework Programme. In this document, the Commission underlined its readiness to mark, with this new Programme, a distinct break with earlier Framework Programmes, by focusing efforts to a greater extent, by improving the consistency of the overall approach and by paying greater attention to the exploitation of results and the management aspects.

The first Working Paper dated 20 November clarified and gave more detail about the proposed structure and instruments for implementing the Programme. The two documents have already been widely discussed, and the validity of the proposed guidelines have been broadly endorsed.

The purpose of this second Working Paper is to give a more detailed idea of the possible content of the 5th Framework Programme and the scientific and technological objectives of the proposed activities within the various programmes.

These objectives have been formulated on the basis of an analysis of the socio-economic and technological situation in Europe, and the conclusions of the evaluation of the activities conducted under earlier Framework Programmes.

In support of this Communication, the Commission Services have prepared separate documents setting out the main socio-economic and technological indicators and a summary of the conclusions of the five-year evaluation reports on European Union activities.

This Working Paper also explains the criteria used to select the objectives and provides further clarifications about the implementation and legal and financial aspects.

These aspects and the financial aspects will be explained in full in the formal proposal concerning the 5th Framework Programme that the Commission plans to submit at the end of March 1997, and which will contain the Commission's definitive proposals in the light of reactions to this Working Paper.

THE CRITERIA FOR SELECTING THE OBJECTIVES AND AREAS

The basic task of the European Union's research and technological development policy is to ensure that advances in knowledge and technologies serve the purposes of the Union and its policies. From this perspective, the two inseparably linked objectives of this policy are:

- to maintain and enhance, in the context of a genuine "*European research area*", the research potential of European laboratories, universities and companies and their ability to produce knowledge of the highest level and high-quality technologies;
- to help ensure that European research serves the Union's economic and social objectives, in other words European research at the service of the citizen and European competitiveness in a global framework.

Basically, therefore, as provided for in Article 130f of the Treaty on European Union, the EU's research and technological development policy is based on the twin principles of scientific and technological excellence and relevance to the objectives of Union policies.

On account of these specific features, and in pursuit of a cost-benefit approach dictated by concern for optimum allocation of European public funding, the choice of objectives and activities under the Framework Programme must be made on the basis of a set of clear criteria.

This requirement is particularly important in the case of the Fifth Framework Programme where it is expected that its definition should be marked by a particular effort of selectivity and concentration on a limited number of areas and objectives. The Fifth Framework Programme will therefore use for the definition of its content, three categories of criteria[1]:

Criteria related to social objectives

The scientific and technological objectives selected must help to further major European Union social objectives reflecting the expectations and concerns of EU citizens:

- improving employment;
- promoting the quality of life and health;
- preserving the environment.

Criteria related to economic development and scientific and technological prospects

The scientific and technological objectives selected must correspond to areas:

- which are expanding and which create good growth prospects;
- in which European firms can and must become more competitive;
- in which prospects of significant technological progress are opening up.

Criteria related to the European "value added" and the subsidiarity principle

The scientific and technological objectives selected cannot be achieved through private research alone and are more effectively pursued at the European level and can be achieved more easily with projects at that level:

- because a "critical mass" in human and financial terms needs to be established, and a mixture of complementary expertise found in the various countries is needed;
- because a significant contribution can be made in this way to the implementation of one or more European Union policies;
- because these objectives concern European problems, aspects of standardisation and the development of the European area.

These criteria have been used for the identification of:

- the six major priority areas set out in the Communication *"Inventing Tomorrow";*
- scientific and technological objectives for the activities which could be conducted under the programmes corresponding to those priorities.

They will also be used during the subsequent stages of preparing the Framework Programme and they will continue to guide the concentration and selectivity effort at the stages of the definition of the detailed content of specific programmes and of their work programmes, as well as at the proposal selection stage, where they will help to identify the relevance of proposals to the objectives. They should also subsequently facilitate programme evaluation.

---

[1] For clarity, these criteria are presented separately; however, several of them are highly interrelated (eg growth, competitiveness, employment).

THE PROGRAMMES: CONTENT AND OBJECTIVES

The Treaty on European Union provides for four types of activities to implement research and technological development policy.[2] The structure of the Fifth Framework Programme takes this into account. This section describes how the proposed programmes would be organised on the basis of these four activities and sets out the scientific and technological objectives identified for the activities under the programmes.

1. Organisation and Content

In its first Working Paper dated 20 November 1996 the Commission proposed organising the Fifth Framework Programme on the basis of six programmes corresponding to the six priorities identified in the Communication *"Inventing Tomorrow"*. The first three programmes ("thematic" programmes) are the research and technological development programmes corresponding to the first activity referred to in the Treaty. The last three ("horizontal" programmes) are programmes corresponding to activities II, III and IV respectively.

Table No. 2: The six programmes proposed for the Framework Programme

Three "thematic" programmes:

- *"Unlocking the resources of the living world and the ecosystem"*
- "*Creating a user-friendly information society*"
- "*Promoting competitive and sustainable growth*".

Three "horizontal" programmes:

- *"Confirming the international role of European research"*
- "*Innovation and participation of SMEs*"
- "*Improving human potential*".

The "thematic" and "horizontal" programmes would be both complementary and interrelated. With a view to maximum efficiency, and in line with the recommendations of the Framework Programme evaluation panel, it is proposed that the greatest possible account should be taken of the objectives of activities II, III and IV in the "thematic" programmes. One of the main functions of the "horizontal" programmes would therefore be to ensure coordinated implementation of all the activities related to these objectives at the level of the Framework Programme as a whole. While having their own objectives, the "horizontal" programmes would therefore help in the coherent implementation of the "thematic" programmes.[3]

1.1 *The content of the "thematic" programmes*

These programmes would be organised in such a way as to reconcile the desire to focus efforts on a limited number of objectives and the need to maintain and strengthen the science and technology base. To this end, these three programmes would comprise, firstly, a series of "key actions", secondly, general activities for the development of generic technologies and basic research, and, thirdly, activities in support of research infrastructures.

(i) Key actions

The aim of these actions would be to stimulate the implementation, on topics connected with priority social and economic objectives for the European Union, of comprehensive approaches based on the mobilisation of a wide spectrum of disciplines, technologies and knowhow, concentrating on the bottlenecks of all types (scientific, technological and socio-economic) which are hindering the resolution of the problems involved. The experience built up during the first phase of implementation of the Fourth Framework Programme shows that organising the Fifth Framework Programme in a limited number of bigger programmes, while creating the conditions for more consistent and more effective management, would make it much easier to carry out such actions.

For the implementation of "key actions", lessons would be drawn from the pilot experience of "Task Forces" set up in the Fourth Framework Programme. In particular, their detailed content would be defined and their implementation monitored in close conjunction with research players and users. In this process, the detailed arrangements of which are being examined, efforts will be made to maintain an appropriate balance between suppliers and users of knowledge and technology.

---

[2] Activity I. *Implementation of research, technological development and demonstration programmes by promoting cooperation with and between enterprises, research centres and universities:* Activity II. *Promotion of cooperation in the field of research, technological development and demonstration (. . .) with third countries and international organisations:* Activity III. *Dissemination and optimisation of the results of research, technological development and demonstration activities (. . .)* Activity IV. *Stimulation of the training and mobility of researchers (. . .).*

[3] Some of the programme activities would be implemented by the Joint Research Centre (JRC). As the Commission's scientific and technical arm, the JRC provides, through its impartial and idependent position, the expertise and support needed for the implementation of Union policies.

One of the aims pursued would be to stimulate the emergence of a genuinely integrated science and technology area in the fields concerned, by mobilising public and private European and national resources in an convergent manner.

As and when implemented, the key actions would give rise to the definition and launching of large targeted projects.

On the basis notably of an analysis of the needs capable of being most effectively addressed at European Union level, 16 subjects for key actions to be undertaken are proposed.[4]

(ii) General activities for the development of generic technologies and basic research

These activities represent the "traditional" component of EU research programmes and would comprise a significant volume of activities, but on very selectively defined topics. These activities would complement the key actions, covering work either on topics linked to the objectives of the programme but distinct from those of the key actions, or on the topics of the key actions but addressing other aspects of those topics than those considered in those actions, particularly the more fundamental aspects.

Complementing the key actions, the activities for the development of generic technologies and basic research would therefore also provide support for such actions. Carrying them out would help to both achieve the objectives of the programme and implement the research and technological development policy of the union as a whole: one of their prime functions would be to help the Union maintain and develop the flow of ideas and knowledge, as well as its technological capability.

(iii) Support for research infrastructures

In most of the areas covered by the three programmes it is necessary to use different types of infrastructure in order to conduct research activities: large facilities, networks, centres of excellence. With a view to making the most cost-effective use of them and in order to improve the consistency of the European research fabric, greater support would be provided than hitherto towards optimizing the utilization of such infrastructure on a European scale.

1.2 *The content of the "horizontal" programmes*

The "horizontal" programmes are at the crossroads of European Union research policy and its external policy, innovation policy, and policy on education and training and the promotion of personal mobility. Each of them would comprise:

- activities directly linked to those conducted in liaison with their respective objectives in the context of the "thematic" programmes. They would essentially take the form of coordination, support and accompanying activities;
- activities linked to the general objectives of European Union policy in the field of external relations, innovation and human resources which cannot be carried out under the "thematic" programmes.

The two categories of activities would be carried out in close coordination between each other and with the corresponding activities under the "thematic" programmes.

1.3 *Coordination*

By reducing the number of programmes, some contributors to administrative compartmentalisation are eliminated, and they should not be reintroduced. The activities under each of the programmes would therefore be conducted, much more clearly than before, in close consultation with those of other programmes. In some cases they would be implemented in the context of actual inter-programme integration.

This formula is essential for the implementation of multi-disciplinary activities of very general interest, based on work carried out in several programmes. This would be the case notably in the fields of space technologies, the key action on "The City of Tomorrow" and of course, the key action on "Products, Processes, Organisation" which is equally relevant to the two programmes "Creating a User-Friendly Information Society" and "Promoting Competitive and Sustainable Growth".

Giving a much larger role to the demonstration dimension, as well as to pre-normative research aspects, the research activities under the various programmes would take more account, from the start, of user and consumer requirements in terms of safety and quality.

---

[4] Justification based on the identified criteria is provided to support the outlines of key actions in the new chapter. The synopsis table in Annex 1 suggests the extent to which each of these actions satisfies the different criteria.

2. The Scientific and Technological Objectives

2.1 *Unlocking the resources of the living world and the ecosystem*

The progress of knowledge and technology in the fields of the living world and the environment is essential for the implementation of the policies of the Union, in particular in the fields of health, agriculture, and the environment, as well as its industrial policy.

In this context, a broad range of new markets, bringing growth and employment, should soon emerge.

To ensure the exploitation of these markets and to optimise their impact on the quality of life of its citizens, the Union can build on its strong tradition in molecular biology and biochemistry, medical and pharmaceutical research, and agronomic and environmental sciences, and on its great potential in the corresponding areas of industry.

(i) General objectives of the programme

To acquire knowledge and develop the necessary technologies to:

— maintain and improve the quality of life of the citizens of Europe and the quality of the environment in Europe;

— increase the competitiveness of European industry, particularly in the fields of biotechnology, health, agro-industry and the environment;

— understand and master the problems and trends affecting the environment on the European and worldwide scale.

(ii) Scientific and technological objectives

Key actions

The living world and ecosystem (I): health and food

The quality of food is a subject of major concern for the people of Europe and they expect the Union to provide a permanent framework for its guarantee. With this in mind, this action would aim at the development of knowledge, technologies and methods based, for example, on biotechnology for the production in Europe of a safe, healthy, balanced and varied food supply. This requires as a priority the development of tests to detect, and methods to eliminate, infectious and toxic agents, as well as work in the areas of epidemiology, science and technology of nutrition, and public health.

Aspects of justification[5]*:* The problem of "mad cows" and the controversies surrounding genetically modified soya and maize have indicated clearly that the quality of food is a matter of public concern which must be addressed as a serious social issue on a European scale. The European Union is the world's largest producer of food and drink, which represent 16.5 per cent of its industrial production. The impact of food on health can easily and accurately be illustrated by comparing clinical and epidemiological data from different European countries.

The living world and ecosystem (II): control of viral and infectious diseases

Despite the progress achieved by medicine during the 20th century, microbial, viral, parasitic, "prion", and infectious diseases are still far from being under control. With responsibility for ensuring a high level of public health in Europe, the Union has to help fight them. Such would be the aim of this action, which would focus particularly on the fight against AIDS, the control of the "new plagues" (haemorrhagic fevers, illnesses connected with new or mutant microbial or viral strains), and the development of vaccines, especially against viral illnesses. Close attention would be paid to prevention strategies and to aspects connected with public health and care provision systems.

Aspects of justification: Infectious diseases kill 17 million people every year throughout the world and 30 new epidemics have been observed during the last two decades. The world market for vaccines (3 billion ECU per annum) is set to grow by 9.7 per cent per annum in the coming years; the world market for vaccines for the treatment and prevention of cancer could reach 10 billion ECU in the year 2000. Multicentre clinical trials at European level will allow a considerable increase in the speed of development, authorisation and marketing of new medicines and facilitate their use throughout Europe.

The living world and ecosystem (III): the "cell factory"

Progress in the science and technology of the living world opens up considerable opportunities for industry. To assist enterprises to exploit these opportunities in the single market in the context of the Union's policies on, for example, health and the environment, the aim of this action would be the development of multidisciplinary technologies based on the exploitation of the properties of living organisms (micro-organisms, plants and animals) at the cellular and subcellular levels, in order to develop, in particular, new antibiotics and anticancer agents, biotreatment methods for waste, and new biological processes for the agri-food industry.

---

[5] This justification gives examples, for illustrative purposes, based on the three categories of criteria - societal demand, economic and technological prospects and European added value.

Aspects of justification: 280 new therapeutic molecules were developed in 1995 through biotechnology. The European market for biotechnology-derived products has grown by 30 per cent since 1995 and should reach 100 billion ECU by the year 2000. Biotechnology is an activity at the intersection between many disciplines and technologies. Progress relies on combining a range of skills and knowledge, and this is much easier to achieve at European level. This sector also plays a very important role with respect to the Union's industrial policy, and must be considered in the framework of an overall approach which covers the industrial, research, environment and ethical aspects together.

The living world and ecosystem (IV): management and quality of water

Now a rare resource whose quality is under threat, water must be managed in the most rational way possible. Situated at the intersection of agricultural policy, environmental policy and regional policy, this action would aim to produce the knowledge and the technologies necessary to achieve this, to satisfy both domestic needs and those of industry and agriculture. Among the priority fields concerned are: technologies for treatment and purification; for monitoring the quality of the water table and of surface waters; systems for surveillance, warning and communication; technologies for the regulation of stocks and technologies for arid and semi-arid regions.

Aspects of justification: 20 per cent of surface water in the Union is threatened by pollution and more than 60 per cent of farmland contains levels of fertilisers and pesticides considered alarming in terms of local water quality. Investments in equipment and services for water in the European Union are likely to be more than 30 billion ECU in the year 2000. Water is in many cases a shared resource across the Union; several member states depend for more than 30 per cent of their water on suppliers from other countries. The problem of water quality also plays a central role in the Union's environmental policy.

The living world and ecosystem (V): environment and health

The deterioration of the environment can have a serious adverse effect on health. The aim of this action would be to help reduce this effect, starting with a better understanding of the mechanisms involved. It would consist in particular of work on epidemiology and the development of new methods of diagnosis and prevention, as well as methods to reduce harmful impacts, and be carried out in close coordination with the aims of the Union's environmental policy objectives and would concern subjects such as the effects on health of air pollution, heavy metals and toxic substances, electromagnetic radiation, the effects of pollution at the workplace, and the impact of climatic changes on public health.

Aspects of justification: 13 per cent of cases of asthma and 15 per cent of respiratory infections affecting the European urban population could be related to exposure to urban pollution. Much of the progress made in improving our understanding of the effects of heavy metals (such as lead) on health is due to comparative epidemiology at the European level. Regulations adopted at European level on nuclear and industrial safety and the safety of domestic products depend on the availability of an objective scientific information base.

The living world and ecosystem (VI): new rural and coastal areas

Agriculture and fisheries, essential areas of activity in rural and coastal areas, are facing profound changes. From this perspective, the aim of this action would be to mobilise knowledge and the technologies needed to put in place innovative approaches to production and exploitation, adapted to recent adjustments in the common agricultural and fisheries policies, whilst also providing the scientific basis for Community regulations. Among the priority areas are: new systems of production and utilisation in agriculture, forestry and fishing taking into account profitability, the sustainable management of resources, product quality and employment; non-food uses; control methods; new models of sustainable development of rural and coastal areas based on optimisation of the specific potential of each area and the diversification of activities and the use of land, and involving the people concerned.

Aspects of justification: 80 per cent of the Union's territory can be categorised as rural, and the agricultural sector is made up of nearly seven million holdings which give work to some 14 million people. In the fisheries sector, 70,000 enterprises (essentially SMEs) generate a turnover of nearly 20 billion ECU. Agriculture and fisheries are fully integrated policies at European level and account for half of the Community budget. The European Parliament and the Committee of the Regions recently confirmed their desire to give rural areas the means to play their full part in the territory and economy of the Union.

General activities for the development of generic technologies and basic research

Work would concentrate on the following priorities:

- research in support of the fight against age-related diseases and health problems (eg Alzheimer's disease), degenerative illnesses (eg cancer and diabetes), illnesses of genetic origin and rare diseases; genome research and the neurosciences;
- research in support of the improvement of health systems, the improvement of safety at work, and the fight against drug-related public health problems, bioethics;
- research to support the fight against major natural and technological risks (in particular "global change"): forecasting, prevention, evaluation of impacts and investigation of consequences, research on the impact of environmental changes on the economy, society and employment within a perspective of sustainable development;
- work to support the development of generic earth observation technologies, notably satellite technologies, for environmental monitoring and resources management.

Support for research infrastructure

- support for optimum use at European level of infrastructure such as databases and collections of biological material; clinical testing centres; marine research facilities and computer centres for climate studies.

(iii) **Consideration of the recommendations of the evaluation exercise**

Recommendations of the programmes' evaluation panels in the areas concerned include:

- a stronger involvement of user sectors and the industrial sphere should be sought (Biotechnology);
- greater account should be taken of "sustainability" aspects and the concerns of consumers (Agriculture and Fisheries);
- actions should be directed more strongly towards the needs of users and should be designed with more attention to short-and medium-term policy objectives (Environment).

2.2 *Creating a user-friendly information society*

The creation of the information society can make a significant contribution to renewed growth and the development of new forms of jobs in the Union: the development of information and communications technologies and their application will lead to the creation of several million jobs in Europe.

The Union is faced with intense international competition yet concerned to preserve the cultural diversity which constitutes its wealth. It must therefore develop those technologies which will make it possible to create an original and user-friendly kind of information society.

The information society means fundamental industrial and social change: its establishment is opening up multiple possibilities for new activities, both for individuals and for companies, in the fields of trade, work, transport, education, health and culture. The technologies associated with the information society at the same time penetrate every kind of industrial activity and all areas of society. Their economic and social impact by far exceeds that of the industries which directly produce information and communications equipment and services. In some, these technologies provide a vital contribution to the key actions of the other two thematic programmes.

(i) **General objectives of the programme**

It will not be possible to achieve fully the potential of the information society on the basis of the systems and technologies of today. Continual progress is being made in the essential technologies such as microelectronics and this determines all the new applications. A continuous effort of research, technological development, and technology adoption is therefore necessary, which requires a single, integrated programme to be put into effect in conjunction with the policies of the Union. The aim of this programme should be to help the goods, services and methods made possible by the technologies of the information society to contribute to the achievement of the political goals of the Union in:

- creating new jobs and strengthening the competitiveness of companies;
- stimulating the development of new markets and services of general interest and strengthening the role of the general public in society;
- improving the attractiveness of Europe as a place for investment, research and innovation, and strengthening the scientific and technological base of the Union, with the goal of reinforcing global competitiveness.

To fully achieve its potential, such a programme must take into account, on a cost/benefit basis, the need for accessibility and interoperability, at all levels, from technologies and tools to systems and applications.

In determining the structure of the programme, account must be taken of:

- the links between applications and technologies, so as to reflect the complex dynamics of innovation, pulled by demand and driven by technology, as well as the role played by applications to guide and validate research and to stimulate the adoption of technologies, through encouraging the user-producer link which is at the heart of innovation;

— the need for transdisciplinarity.

In this context, the best structure will be obtained by grouping together those applications and technologies which are most alike or most interdependent and integrating research with technology take-up in order to maximise effectiveness and minimise the need for co-ordination. These considerations lead to a programme of four closely co-ordinated key actions, supported by a group of basic research activities.

(ii) **Scientific and technological objectives**

Key actions

Information society (I): services for the citizen

Information society technologies must meet users' and consumers' expectations and requirements and the need to provide them with access, at the lowest cost, to quality general-purpose services. This key action would emphasise interoperability of applications and focus on the following five priority fields: education and training, health and the elderly, public authorities, the environment and transport. Particular attention would be given to the integration of these applications and their validation in digital sites, towns or regions. In education and training, the emphasis would be on multimedia applications and new teaching methods using simulation and virtual reality and lastly, the development of applications using broadband communications. On the subject of health and the elderly, priority would be on developing computerised medical systems, secure high capacity health networks; and advanced interfaces and tele-systems for the integration of the elderly and the disabled into social life. The tasks of the public authorities could be made easier by giving the public and businesses better access to public services through applications giving access to "on-line government". As regards environmental protection, priority would go to the development of telematic systems for environmental managers and for the public for the purposes of surveillance, analysis and issuing warnings. Finally, transport would benefit from the development of the advanced telematic systems needed for management and teleservices.

Aspects of justification: the countries of European Union are all faced with the challenge of improving the quality of their public services while containing costs. Furthermore, the emergence of the information society in these sectors provides major opportunities for industry and employment. Indeed, the number of households connected to electronic information networks is set to triple worldwide between 1996 and the year 2000 to a total of 100 million, including 30 million in Europe. Within 10 years, the market for applications connected with the Information Society could be worth several billion ECU annually: for example ECU 15 billion for health applications, ECU 10 billion for education and training, ECU 8 billion for transport-related telematics alone, and ECU 5 billion for the environment. The applications involved in the information society (health, transport, education and the environment) are transnational by nature and constitute several of the European Union's policy areas. Performing activities in this area at a European level will help with the required modernisation of the sectors concerned, ensure the interoperability of services and compatibility of equipment, and help to preserve Europe's linguistic and cultural diversity.

Information society (II): electronic trade and new methods of work

The completion of the single market and Economic and Monetary Union are two major priorities of the European Union. This action would aim to help European enterprises operate efficiently and enable them to become more fully part of the global economy, amongst other things by means of modern statistical systems. It would focus in particular on improving the efficiency of trade in goods and services. Among the topics concerned are management systems for suppliers and consumers; the security of information and networks; the technical means for authentication and protection of ownership and the integrity of contents, as well as interoperable payment systems; flexible, mobile and remote working methods both for individuals, and for cooperative- and group-working.

Aspects of justification: by the year 2005, one third of all banking transactions worldwide could be completed electronically: by the year 2000, it is expected that there will be more than 10 million tele-workers in the European Union and nearly 40 per cent of businesses will be trading electronically. By 2004, the European market for commercial telematic services should amount to some ECU 11 billion. The changes in working methods and trade resulting from information and communication technologies mostly go far beyond the level of the individual firm, the industrial or service sector, or even the national economies. They affect the whole world and necessitate action at a European level, if we wish the Union to fulfil its potential as the primary world market.

Information society (III): multimedia contents

Developing creativity in, and increased use of, multimedia contents are two major elements in fully establishing the information society, and helping to promote linguistic and cultural diversity.

The objective of this key action would be the development of innovative forms of multimedia contents as well as tools for structuring and processing them. The action would be focused on three main lines: interactive electronic publishing, with new methods for creating and structuring publications, and for personalised dissemination of information and accessing cultural items, for example through electronic libraries and virtual museums; new language technologies which help to make information and communications sytems more user-friendly; advanced technologies for accessing, filtering and analysing information which help to manage the explosion of information and facilitate the use of multimedia contents, notably with respect to geographical and statistical information systems.

Aspects of justification: the turnover of industries in the European Union connected with the content of information and communication systems and networks amounts to ECU 150 billion per annum. They employ 2.1 million people full time, and within the next 10 years are expected to create one million additional jobs. Even if almost all the information on the Internet is in English, 50 per cent of current Internet users do not have English as their mother tongue. Highlighting Europe's cultural and linguistic diversity forms an important part of the European Union's education, audiovisual and culture policies.

Information society (IV): essential technologies and infrastructures

To foster the spread of the information society throughout Europe, excellence in the technologies constituting its key elements should be promoted, their introduction speeded up, and their field of application broadened. These technologies include: computing, communication and network technologies, the latter comprising architectures, protocols and methodologies, as well as their introduction and use; software and systems technologies and engineering; mobile and personal communications, in particular satellite-based services; interfaces making use of multiple human senses; peripherals, eg flat screens, microsystems; micro-electronics (technologies, skills, equipment and hardware necessary for the design of circuits and the development of applications).

Aspects of justification: from 1994 to 1995, the worldwide market in information society technologies grew by 11 per cent—more than any other economic sector. In 1995, this market was worth ECU 304 billion. Approximately 40-50 per cent of the cost of a modern aircraft is for avionics hardware and software. More than 15 per cent of the cost of a car lies in its electronics.

General activities for the development of generic technologies and basic research

Work undertaken from a "visionary" perspective, connected with all the key actions and intended to ensure a continuous flow of ideas from laboratories to industry.

This would be focused on the following priorities:

- technologies for the representation, creation and handling of knowledge;
- simulation and visualisation technologies in real time and on a large scale, and virtual presence technologies;
- quantum, photonic, bio-electronic technologies for very large scale integration, ultra-high performance computers and super-intelligent networks.

Support for research infrastructure

- support for advanced high-flow electronic networks for research. These networks would be particularly useful for all programmes.

(iii) **Consideration of recommendations from evaluation exercises**

Recommendations of the programmes' evaluation panels in the areas concerned include:

- the three programmes dealing with telematic applications, advanced communications technologies and information technologies should be grouped together in a single programme (common conclusion of the evaluation panels of the three programmes);
- work on telematics should be concentrated on emerging sectors and those sectors with a particular economic and social relevance, such as those linked to the information society (Telematics Applications);
- support for the development of interactive multimedia services should be increased (Advanced communications technologies).

2.3 *Promoting competitive and sustainable growth*

Strengthening the competitiveness of firms and moving towards sustainable development are two complementary and inseparable objectives for the Union: the products and processes which will be competitive on tomorrow's markets will also be "clean", intelligent products and processes.

The development, distribution and application of knowledge and technologies necessary to reach these goals are crucial for the implementation of the Union's industrial policy, and its policies in numerous other fields, especially transport and energy.

The objective of competitive and sustainable growth should also be extended to urban areas, in which most European citizens live and work.

(i) General objectives of the programme

To produce the knowledge and technologies which may help to increase growth and create new jobs in Europe, by helping to develop:

- "clean" and "intelligent" industrial products and processes to boost European industrial competitiveness, which will give businesses the opportunity to make the necessary adjustments to their activities;
- energy systems and services guaranteeing security of supply and sustainable exploitation.

(ii) Scientific and technological objectives

Key actions

Competitive and sustainable growth (I): products, processes, organisation

To improve their position in the face of increasingly harsh world competition, European industry and enterprises must be able to put innovative products and services on the market and develop new production and fabrication methods. The research would cover the elaboration, development and integration of new technologies for design, manufacturing, control and production: micro-engineering and micro-systems; information society technologies for "intelligent" manufacturing, including systems of flexible workshops and flexible management of supply chains, embedded systems and remote services for operation and maintenance and simulation and shared-work technologies; technologies to reduce resource utilisation and effluents, for waste recycling and for the development of clean products, based on the concept of "life cycle analysis"; new methods of organisation of work and production, and for using skills.

Aspects of justification: The European Union market for industrial goods and associated services amounts to an estimated 4,500 billion ECU per annum. Two million enterprises (99 per cent with fewer than 500 employees) are involved, employing some 40 million people. The market for environmental protection products is forecast to grow by 50 to 100 per cent between now and the year 2000. Use of flexible systems of production and clean production processes should bring about, in time, a reduction of 50 per cent in both industrial energy consumption and time to market of products. In addition to cost-sharing, co-operative research will facilitate the elaboration and adoption of standards which will be essential in the operation of the internal market.

Competitive and sustainable growth (II): sustainable mobility and intermodality

In an integrated Europe, the mobility of people and goods will considerably increase. This must be able to take place effectively and without damage to the environment, while reducing the costs in particular of traffic congestion and accidents. This action is intended to assist in this process, at the point at which transport, environment and regional policies intersect, by helping to set up a safe, intelligent and interoperable land, air and maritime transport system for passengers and freight on a broadly intermodal basis at the European level. This requires, among other things, the development of systems for the rational management of transport, including second-generation satellite navigation and positioning systems; research on infrastructures, accessibility and the integration of regional planning and transport policies; and the development of socio-economic scenarios.

Aspects of justification: Demand for internal transport of goods within the Union doubled between 1975 and 1995 and will probably double again between now and 2025. The costs of road congestion in the Union amount to 120 billion ECU per annum and the total cost of transport "externalities" is estimated at 250 billion ECU per annum. As it is closely related to the Trans-European Networks policy being implemented by the Union, following on to the White Paper on Growth, Competitiveness, Employment, and will involve the very large number of SMEs operating in this sector, the development of an intermodal transport system can by definition only be conceived from a European perspective.

Competitive and sustainable growth (III): new perspectives in aeronautics

Aeronautics is one of the most successful sectors of European industry and is one of the Union's main export industries. This action would aim at helping the Union to maintain and consolidate its position in this field by improving its mastery of advanced technologies. It would cover, more especially, new integrated design and manufacturing technologies, as well as the reduction of energy consumption, emissions and noise for various designs of aircraft, and include demonstration activities on these topic;: technological and economic feasibility of new generation aircraft concepts.

Aspects of justification: Air traffic is forecast to double in volume between now and 2000 and 15,000 new aircraft need to be produced before then. The European aeronautics industry exports two thirds of its production and its performance depends directly on the quality and competitiveness of its products. European companies started gaining new markets when they got together to create the Airbus 25 years ago. The growing links now visible among US aeronautics companies to which the US Government pays a large amount of state aid, could mean the Union might be facing a de facto monopoly controlling 70 per cent of the world market and should encourage Europeans to invest further in the field.

Competitive and sustainable growth (IV): marine technologies

The sea, which surrounds Europe on every side and has played such an important part in European history, is a major economic, social and technological challenge for the Union. The objective of this action would be to boost the development and integration of specific knowledge and technologies which would enable the Union to fully utilize the sea's potential, in support of a true European policy of the sea. The emphasis would be on technologies needed to boost the competitiveness of Europe in the range of areas concerned: technologies for the design of advanced ships which would be safe, efficient and environmentally friendly, for the use of the sea as an economical means of transporting goods and people (advanced port infrastructure; regional maritime transport systems); and for the rational and sustainable exploitation of the sea as a source of energy and mineral resources (offshore and subsea technologies).

Aspects of justification: The Union has 90,000 km of coastline and 47 per cent of its inhabitants live less than 50 km from the sea. 90 per cent of the Union's foreign trade is transported by sea. Between 3 and 5 per cent of the Union's GDP relates directly to marine industries and services and marine industries enploy more than 2.5 million people throughout the Union. The sea is central to the Union's industrial, environment, fisheries, research and energy policies and is the subject of several international agreements to which the Union is a party.

Competitive and sustainable growth (V): advanced energy systems and services

The expected growth in the demand for energy and the need to meet this demand without endangering the environment are a major challenge for the Union. This action, based on market needs, would aim to help meet this demand, through the development and improvement of advanced energy systems that are efficient as regards both production and consumption, so as to achieve a substantial reduction of CO_2 emissions and other greenhouse gases. The work would cover new and renewable sources of energy and their integration into decentralised systems; technologies for energy storage and transmission; technologies for clean use of fossil energies and the rational use of energy; technologies for exploiting controlled thermonuclear fusion (in the context, notably, of the ITER experimental international reactor project); study of economy/environment/energy interactions.

Aspects of justification: Total energy consumption in Europe is forecast to grow by 20 per cent between now and 2020, and the related production of CO_2 should rise by 14 per cent unless specific measures are adopted. The world market for energy technologies should grow over the next few years to more than 800 billion ECU per annum. In its Green Book on Renewable Energies, the Commission proposed as an objective the doubling of the share of these technologies in the Union's total energy supply, to rise to 12 per cent by 2005. The Union's energy policy is based on the diversification of sources of supply and the maintenance of a diversified technological capability which is easier to achieve through European co-operation.

Competitive and sustainable growth (VI): the city of tomorrow

Most Europeans live and work in towns and cities. The urban environment is the focus of most new developments in the economy and society but it also exacerbates the resulting problems. Their harmonious development must be approached from a global, innovative viewpoint based on advanced models of urban organisation blending together the heritage of the past, eg the cultural heritage, the restoration of social equilibrium, eg making city life safer, and the development towards a "value-added" economy. The action would focus as a priority on technologies for the integrated management of transport (see the key action on sustainable mobility and intermodality), energy (notably in buildings) (see the key action on advanced energy systems and services) and technologies for economic and sustainable construction; and technologies necessary for the development and demonstration in urban contexts of economic, clean, safe and intelligent motor vehicles, eg zero-emission vehicles.

Aspects of justification: 80 per cent of Europeans live today in towns and cities, which are the focus of most economic activity in Member States. The costs of the decay of the European cultural heritage are estimated at more than 14 billion ECU per annum. Towns and cities have played a key role in European history and today contribute substantially to European integration through the creation of networks of co-operation and trade between big regional metropoles (Euro-metropoles; Euro-cities etc).

General activities for the development of generic technologies and basic research

The effort would concentrate in particular on the following priorities:

— research to support the development of new materials for industry and the processes for their manufacture; materials resistant to high temperatures (for example for energy generation and engines); light materials (for transport and construction); functional materials (opto-electronics, biomaterials, sensors) designed and developed with ease of recycling in mind; new materials and technologies for the production of coal and steel[6];

— precompetitive research in support of standardisation and the fight against fraud as well as on product and service quality (including the development of high-precision measuring instruments);

— research in support of nuclear safety and security: work on the nuclear fuel cycle, storage and waste processing; control of fissile material; the effects of radiation; and to support the development of new designs of inherently safe systems;

Support for research infrastructures;

— support for optimum use, at European level, of computing centres for industrial research; high power wind tunnels; specialized databases; test laboratories.

(iii) **Consideration of recommendations from evaluation exercises**

Recommendations of the programmes' evaluation panels in the areas concerned include:

— implement an approach combining a "vertical" concentration on a limited number of application topics and "horizontal" support for generic technologies (Industrial Technologies);

— guide activities in a more definite way towards users' needs and applications (Non-nuclear energy);

— keep an appropriate balance between technological research and policy research in transport (Transport).

2.4 *Confirming the international role of European research*

In a world characterized by increasing globalization of economies, problems and issues, international cooperation has become an important dimension of the research policy of the European Union.

It should contribute significantly to the implementation of the Union's external policy, especially the policy towards Central and Eastern European adhesion candidate countries, and promote its role on the international stage.

Scientific and technological cooperation should also help the Union establish industrial cooperation and conquer new markets.

(i) **General objectives of the programme**

Operating in the context of the implementation of the Union's foreign policy, and with the accession of new Member States in mind, the general objectives of the programme would be:

— to promote scientific and technological coooperation between entities and researchers from third countries and from the Union, likely to produce significant and balanced benefits for both sides (cooperation for "mutual benefit");

— to facilitate access for European laboratories and firms to scientific skills and know-how available outside the Union, useful to the interests of the Union;

— to strengthen the competitiveness of European industry and its presence in new markets and help those involved in European research obtain information on research capabilities, activities and priorities outside the Union.

(ii) **Specific objectives**

The Union pursues its international scientific and technological co-operation policy with both co-operation and competition in mind. Rooted in the principle of mutual benefit, cooperation with different groups of countries would also be geared towards specific objectives:

— *Associated countries of Central and Eastern Europe:* to prepare their accession to the Union by helping them to preserve and develop their research capabilities and apply them to their economic and social needs;

— *Mediterranean third countries:* to assist the development of scientific and technological cooperation in support of the Euro-Mediterranean Partnership; to help economic take-off, social development and the development of new markets in these countries:

---

[6] Under the framework programme, it is proposed increasingly to expand the activities currently being carried out on the basis of the ECSC Treaty, which expires in 2002.

- *Non-associated countries of Central and Eastern Europe:* to help these countries stabilize their human resources in research and mobilize their scientific and technological capacity in support of economic and social development;
- *Newly Independent States of the former Soviet Union:* to stabilize their human resources in research and to help them apply their research capabilities to the modernization of their economies and to the resolution of the environmental, health, transport, communications and nuclear safety problems they must confront;
- *Industrialized countries:* to obtain access for European researchers to the knowledge and know-how existing in these countries, in order to increase the level of their activities;
- *"Emerging economies":* to develop scientific and technological cooperation so as to facilitate access for European companies to these fast-growing markets;
- *Developing countries:* to associate researchers in these countries with the production of specific scientific knowledge and appropriate technologies which can help solve their development problems.

International scientific and technological cooperation activities would be implemented in two ways, in line with cooperation agreements where these exist: on the one hand, participation of third country entities in the other programmes; on the other, activities specific to the international cooperation programme. Within each of these big categories, various cooperation formulas would be used according to the countries involved, the nature of the activities and the sources of financing.

— Participation of third country entities in programmes:

Four instances are envisaged:

- Full association with the Framework Programme (certain accession candidate countries choosing this formula[7] notably Central and Eastern European; third countries of the European Economic Area; Israel[8]): participation under similar conditions as for Member States, detailed arrangements for Central and Eastern European countries still to be determined. The technical assistance fund for Central and Eastern European countries, Phare, could be used to support this participation in accordance with its own operating rules.
- *Participation in programmes open to third countries* on the basis of bilateral or multilateral co-operation agreements (certain industrialised third countries and "emerging economy" countries). "Project-by-project" participation (with no financing from the Framework Programme for the third country partner). Measures would be taken to enhance access to the Framework Programme for "emerging economy" countries.
- *Participation in programmes open to third countries* without specific co-operation agreements (principally Central and Eastern European countries not associated with the Framework Programme; European NIS; Mediterranean third countries). Justified by the intensity of the political dialogue, participation on a "project-by-project" basis would in principle be financed by the third countries themselves. The use of the technical assistance funds Phare, Tacis (for NIS) and MEDA (for Mediterranean third countries) could also be studied here.
- *Participation in projects* in which it is in the Union's interest to have third country participants involved (all third countries). This would be financed by the third country or, in certain duly justified cases, by the thematic programme concerned.

— Activities specific to the International co-operation programme:

Three categories of activities would be implemented:

- *Specific co-operation activities* with certain categories of countries (Central and Eastern European countries not associated with the Framework Programme; NIS; Mediterranean third countries; developing countries; "emerging economy" countries). These activities, related to very specific problems faced by these countries (eg in health and environment) and therefore outside the scope of the other programmes, would be financed by the international co-operation programme.
- *Training of researchers*: a system of grants would be established whereby young researchers from third countries could be given a chance to spend time in European laboratories and participate in Framework Programme projects. This would be financed by the international co-operation programme, just like the grant system for young European researchers in Japan and South Korea.
- *Co-ordination* with COST and with the EUREKA initiative, and with other European science and technology co-operation organisations (eg CERN, ESA, EMBL, ESF).

(iii) **Consideration of recommendations from the evaluation exercises**

The evaluation panel's recommendations in this field (international co-operation) included the following:

---

[7] An alternative formula being participation on a programme-by-programme basis.

[8] If the association agreement to the Fourth Framework Programme is extended to the Fifth, as envisaged.

- by the combined use of the international co-operation programme and the PHARE and TACIS assistance funds, to reinforce measures taken to help the Central and Eastern European countries and the Newly Independent States restructure their research systems and apply them to their economic and social needs;
- to attach greater priority to technological co-operation with the "emerging economies".

2.5 *Innovation and participation of SMEs*

Innovation is the key factor in industrial competitiveness. To enable European research to impact fully on growth and employment, and to help it achieve concrete outcomes and economically beneficial and socially desirable results, mechanisms need to be set up to promote innovation, exploit the results of scientific work and stimulate the creation of innovative companies.

Important vectors and actors in innovation, SMEs, which provide 66 per cent of employment in the European Union, should be able to benefit from easy access to the advanced technologies which they need, and to the possibilities offered by the Union's research programmes.

(i) **General objectives of the programme**

The general objectives of the programme would be:

- to improve the economic and social impact of the Union's research projects by reinforcing the mechanisms designed to ensure the best possible exploitation of their results; as well as the dissemination and transfer of the technologies produced;
- to facilitate the access of participants, particularly SMEs, to the instruments which finance innovation and support the creation of innovative enterprises (financial engineering; venture capital);
- to stimulate the participation of SMEs in the Union's research programmes, both SMEs active in research and high technologies and those with little or no research capabilities but with substantial technological needs; to help SMEs, notably in the least favoured regions, to develop their technological capabilities.

The fact is that the real bottle-neck in the European research-development-innovation system is in the transfer of research results to market exploitation. Venture capital exists in Europe, but, in contrast to what happens in the United States, for example, there is not enough of it, and, above all, it is seldom used to finance technological innovation. The problem far exceeds the scope of the Framework Programme. In the context of its activities to promote innovation, the Commission will be working to promote the creation of instruments to remedy this weakness.

(ii) **Specific objectives**

Union action to promote innovation and support the participation of SMEs in the programmes should be undertaken in the double framework of the thematic programmes and the "Innovation and Participation of SMEs" programme. The objectives and methods of this action would be principally as follows:

— *for innovation*

in the various programmes

- integration of mechanisms (eg value analyses, market research, training) into the "life-cycle" of projects, so as to facilitate the exploitation, private financing, and transfer of technologies and results produced, while guaranteeing protection of the knowledge acquired; creation, to this end, of "innovation units" in the programmes;
- management of structured interfaces with the entities which finance innovation and help create innovative start-ups, principally via European organisations and funds (European Investment Fund, European Investment Bank, Eurotech Capital);
- management of innovation support networks specific to the research programmes concerned and the setting-up of networks of cooperation and exchange between innovating companies in the fields of the research programmes.

in the programme *"Innovation and Participation of SMEs".*

- rationalisation and coordination of networks providing information and assistance on the research and innovation activities of the Union, particularly in relation to the identification and dissemination of best practices in the area of technology transfer (joint action: innovation/SMEs); co-ordination of studies and analyses, particularly in the area of innovation policy;
- co-ordination of the operation of the "innovation units" in the programmes, of the structured interfaces with the entities which finance innovation and help create innovative start-ups; conception and definition of new methodologies for technology transfer projects, integrating the technological, economic and social aspects of innovation;
- creation and development of a service giving assistance in the area of Intellectual Property Rights and access to private finance, notably the Venture Capital Funds (joint action innovation/SMEs).

— *for SMEs*

in the various programmes:

- "co-operative research" activities enabling groups of SMEs without suitable research capabilities to entrust the resolution of their common technological problems to third parties;
- activities to support and encourage the participation of SMEs in collaborative and co-operative research projects (eg "exploratory awards") as well as the implementation and co-ordination of national and European information and assistance networks.

in the programme *"Innovation and Participation of SMEs"*:

- management of a "one-stop shop"—for all the research programmes—within the Commission services (for project proposals to be implemented specifically by SMEs).

(iii) Consideration of the recommendations of the evaluation exercises

The evaluation panel's recommendations for this area (dissemination and exploitation of results included the following:

- to reinforce the role of innovation policy in the implementation of the Union's research activities;
- to give greater prominence to innovation even in thematic programmes; the innovation programme should help optimise the work done by the individual programmes;
- to improve co-ordination with the other policies and services of the Commission where these concern innovation.

2.6 *Improving Human Potential*

In the field of science and technology, as in many others, Europe's prime asset is its human resources: the quality of its researchers, engineers and technicians.

In view of foreseeable needs, this human potential must be preserved, must grow in quantitative terms and must be used to the full. At the same time, the Union should help to promote European scientific and technological excellence.

To better identify current and future trends in Europe and economic and social needs, it is also necessary to mobilise the strong European research tradition in economic and social sciences around a limited number of relevant topics.

(i) General objectives of the programme

The general objectives of the programme would be:

- to help to maintain and develop human resources of quality in Europe, particularly by supporting training and by promoting researcher mobility (including towards industry), as well as innovation (methods and technologies) in education and training with a view to creating new jobs;
- to help Europe become a location which can attract researchers and investment in research, and to promote European research in the international arena;
- to develop the knowledge needed for a better understanding of key aspects of the development of European society, and the implementation of science and technology policy and the other Union policies.

(ii) Specific objectives

The programme would be structured in five main lines:

Reinforcement of the European human research capital

The objective would be to establish:

- research training methods, created in advanced and emerging fields of research, on topics freely chosen by the researchers. The accent would be placed on the training of young researchers at pre and post-doctoral level.
- a European grant system comprising "Marie Curie" grants for young researchers, awarded for topics chosen by the researchers themselves, in addition to the grants awarded under the research programmes; industrial grants awarded to companies to assist young or established researchers; development grants intended to help develop a high-level research capacity in the less favoured regions of the Union.

Optimised utilisation of major research infrastructures

The aim is to promote the optimum use of research infrastructures (large facilities, networks, centres of excellence) in those areas (including economic, legal and social science) not covered by the thematic programmes, or for categories of installations not considered by those programmes. To this end, measures are being envisaged to help researchers with access and to set up networks, as well as to support research projects.

Promoting scientific and technological excellence in Europe

The aim here would be to stimulate European scientific and technological excellence through exchange and to make the most of the achievements of European research. This would be promoted by support for high-level scientific conferences, the networking of European researchers active outside Europe, distinctions for high-level research work, and action to raise public awareness and make information available on research activity at European level via electronic networks.

Harnessing socio-economic research to the needs of European society

This activity would complement and support the attention given in the "thematic" programmes to socio-economic aspects. It would cover a limited number of topics linked to the objectives of the Framework Programme. Work would focus primarily on study of the socio-economic impact, in Europe, of the development of services and of the "non-tangible" economy, analysis of the interplay between technological progress, training, work, the legal environment and economic competitiveness and the production and validation of new development models fostering growth, employment and quality of life.

Support for the development of scientific and technological policies in Europe

This would be achieved by setting up an exchange forum, the ETAN network *("European Technology Assessment Network"),* bringing together political decision-makers and researchers specialised in the study of science and technology policies, technology watch activities, forecasting, evaluation of scientific and technological choices, also the development of a system of statistics and scientific, technological and innovation indicators.

(iii) **Consideration of the recommendations of the evaluation exercises**

The evaluation panel's recommendations for these areas included the following:

- to introduce a special measure to support industrial training of researchers (training and mobility);
- to encourage the creation of interdisciplinary projects and industrial participation in networks (training amd mobility);
- to orientate socio-economic research work towards the study of a coherent set of challenges facing Europe, considered from a political perspective (socio-economic research).

THE PROGRAMMES: IMPLEMENTATION AND LEGAL ASPECTS

Implementation and legal aspects will be set out in detail in the formal proposal for the 5th Framework Programme. However, some additional information to that contained in the first working paper can already be provided.

1. Implementation

1.1. *Two major objectives: co-ordination and flexibility*

An essential feature of the 5th Framework Programme should be a substantial improvement in the co-ordination of programmes and in the flow of information and results between their different activities, as well as in the flexibility and response capacity of Union action.

(i) Co-ordination

At the different levels, co-ordination would be achieved through mechanisms incorporated into the programmes:

Co-ordination between programmes. This would be achieved in particular through the key actions, as well as through co-ordination activities carried out in the "horizontal" programmes;

Co-ordination between the research programmes and other activities of the Union. As part of the implementation of the external relations policy, this co-ordination would be achieved as far as international co-operation is concerned, by establishing closer links with the technical and economic assistance programmes PHARE, TACIS, MEDA, the European Development Fund and the PVD-ALA activity. As regards co-ordination with the Structural Funds, common regional frameworks of reflection and action would be put in place, as would mechanisms for closer linkage between the two types of activity, in line with the conclusions of the Communication on "Research and cohesion" which the Commission will be presenting shortly. Close co-ordination would also be ensured with the Union's various programmes and initiatives in related areas, eg education and training through the Socrates and Leonardo programmes.

Co-ordination between European and national activities. This would be achieved in particular through the key actions, which should allow the establishment of closer linkages with initiatives and programmes carried out at Member State level in the areas concerned: through projects for support to research infrastructure; and through co-operation with other European scientific and technological co-operation frameworks (eg EUREKA, COST) and organisations (eg ESA, CERN, EMBL).

(ii) Flexibility

As indicated in the first working paper, and confirmed by the evaluation work, improvements in the flexibility and response capacity of the Union's action will be brought about in particular by:

- regular adaptation of the work programmes, ideally on an annual basis;
- the creation of a "free space" of limited size within each programme. This would be to guarantee that the scope for flexibility which theoretically exists could be efficiently exploited if needed. The aim would be to be able to meet urgent needs arising within the area covered by the programme but which were not explicitly foreseen (unexpected scientific and technological breakthroughs; problems requiring a rapid response) in the shortest possible time. To this end, programme budgets would be committed in such a way as to leave open the possibility, until a point around $\frac{3}{5}$ of the way through the life of a programme, of quickly bringing together resources on a particular theme.

1.2 *Means of implementation*

(i) Indirect action

"Indirect action" by the Union in the area of research would continue to be carried out through shared cost actions, concerted actions, support for collaborative networks and "accompanying measures", strictly aligned with programme objectives.

"Shared cost" actions, in which the Community contributes a part of the costs of research projects carried out by consortia of enterprises, universities and research centres, would continue to be an essential Instrument of programme implementation. The possibility of varying the Commission's contribution according to the nature of the activities and thus the proximity to the market will be studied, in line with international rules and the provisions of the Community framework for state aid for research and development. In selecting proposals the Commission will take account of the partners' efforts in terms of research, investment and employment, both globally and in the specific area of their proposal.

(ii) The Joint Research Centre (JRC)

A second Instrument for implementing the Fifth Framework Programme would be the Joint Research Centre. Carrying out the Fifth Framework Programme will require an important and active contribution from the JRC. The activities carried out to this end would be the subject of two specific decisions covering EC and Euratom aspects respectively, and would focus essentially on the three "thematic" programmes.

A general theme for these activities would be "Research at the service of the individual and the citizen" (health, safety, environment, consumer protection and fraud prevention). Among the areas covered by these themes, particular emphasis would be put on pre-normative research as well as nuclear safety and security (the fuel cycle and control of fissile material).

In view of these priorities, the requirements they reflect and the features and capabilities of the Centre, the institutional and operational role of the JRC in implementing the Fifth Framework Programme would be at least on a par with its role in the Fourth Framework Programme.

Overall, the scientific and technological objective of these activities would be located more particularly in areas requiring neutral and independent expertise at European level, and in the areas corresponding to the objectives of the major Union policies.

In the choice and definition of activities to be carried out, there is a combination of both continuity and evolution; continuity because of the permanence of certain needs; evolution in order to take into account the new objectives for the Union's research policy set out in the Fifth Framework Programme.

In addition, the JRC would continue to pursue vigorously the activities it carries out on a competitive basis, getting as close as possible to the end users of its research, in particular European industry.

(iii) Other means

Besides these two means of action, other mechanisms and Instruments would or could be used in the implementation of the Fifth Framework Programme:

Links with EUREKA and COST

The COST and EUREKA frameworks for European co-operation in areas that are non-competitive and closer to the market, respectively, have demonstrated their usefulness, which springs from their flexibility and the principle of launching activities at the initiative of those concerned. Closer ties between these two co-operation frameworks and the Union's research programmes are both possible and widely supported.

Simple and efficient ways of associating Union projects with EUREKA projects and COST actions would thus be developed and proposed, drawing on the fact that the preparation of the Fifth Framework Programme, the beginning of the implementation of the Third Medium Term Plan of EUREKA and the COST Ministerial Conference in 1997 coincide.

Following the general line set out in the document on "synergy between EUREKA and the programmes of the European Union" prepared by EUREKA High Level Group for the June 1997 Ministerial Conference, and to ensure quick reaction a permanent consultation system should in particular be set up, which would allow the identification, as soon as a project is planned, of those elements which could be covered by the Framework Programme or by EUREKA and guarantee the flow of information from the former to the latter as the work progresses, results are produced and market needs are met. This approach would be applied primarily to large-scale projects developed within the "key actions".

General co-ordination of the links with EUREKA and COST and the definition of common strategic plans would be undertaken within the programme on international co-operation.

Articles 130k, l and n

The possibility has been raised on a number of occasions of exploiting these articles in addition to the other activities of the Framework Programme, notably in order to implement activities which have a particular interest only for a certain number of Member States. This possibility will not become a reality unless the Member States show a firm willingness to enter into this type of initiative.

If such willingness were to be demonstrated, one or more activities of this type could be foreseen, starting, for example, with certain activities identified in this document (eg the key action in the area of aeronautics and activities in the space sector).

The implementation aspects of the 5th Framework Programme will be set out in the formal proposal to be presented at the end of March, as well as in a new proposal on the rules for participation in programmes and the dissemination of research results (implementing Article 130j).

2. LEGAL ASPECTS

The legal aspects, too, will be set out in the formal proposal on the 5th Framework Programme. In defining the legal provisions of the 5th Framework Programme, the following points, in particular, will be taken into account:

- for the sake of rapid and effective implementation, and as was underlined by the Framework Programme evaluation panel, the number of decisions should be kept to a minimum; each programme should therefore give rise to only one decision, except as noted below;
- current legal provisions require separate decisions for activities carried out under the EC Treaty and those carried out under the Euratom Treaty. The programme "*Promoting competitive and sustainable growth*" and the programme of JRC activities will include activities in both of these areas, and each will therefore require two different decisions;
- in the event that activities are decided on the basis of Articles 130k, l and n (in particular 130k, "supplementary programmes"), they would each give rise to a specific decision.

All in all, and not allowing for any supplementary programmes, the adoption and implementation of the 5th Framework Programme should require 12 decisions (two for the EC and Euratom Framework Programmes, seven for the six programmes, two for the JRC, one for the implementation of Article 130j), ie around half the number required for the 4th Framework Programme. In setting out the timetable for their adoption, the need to launch the 5th Framework Programme at the beginning of 1999 will be kept in mind, which means launching the first calls for proposals in autumn 1998.

THE PROGRAMMES: MANAGEMENT

One of the most important recommendations coming out of the five-year evaluation of the Framework and specific programmes is the need to slim down the management procedures. Management issues will thus receive particular attention in the implementation of the Fifth Framework Programme, which will continue to be carried out on the basis of the fundamental principles of the running of programmes: equal access, equitable treatment, excellence as a priority, an appropriate balance between speed and rigour, and transparency of procedures.

In some areas, the improvements made to programme management over the last few years need to be supplemented, and measures to increase the consistency and quality of this management need to be reinforced, particularly with a view to facilitating access to the Framework Programme (eg "one stop-shop" for SMEs), reducing processing times, and simplifying procedures.

In addition to those mentioned in the first working paper, the following measures are amongst those currently being studied:

- — the implementation in appropriate cases of a scheme of permanently open calls for proposals, a formula which will allow more flexible and efficient processing of requests for participation;
- — the evolution of the role of programme committees along the lines set out in the inter-institutional agreements, such as to allow faster processing of proposals.

The general organisation of the Fifth Framework Programme in a limited number of large, complementary and connected "thematic" and "horizontal" programmes and the need to take account of modern research management techniques call for a new approach to the management of the Framework Programme.

To ensure genuine co-ordination, the Commission is currently looking into new formulas. One of these would consist in handling certain aspects of the management of the "thematic" programmes on a collegial basis, entrusting implementation and follow-up to a group drawn from the various research services involved. Working in close co-operation with the services responsible for implementing the Union policies concerned, this group would be responsible for supervising the overall implementation of the programme, ensuring the internal co-ordination of the various activities, as well as relations with the other "thematic" and "horizontal" programmes and with the other policies of the Union, and organising the co-ordination of contacts with the other European institutions, the scientific community, the world of industry and, generally, the world of users. In the same spirit, recourse would be had, as often as necessary, to the formula of invitations for multi-programme research proposals.

CONCLUSION

The scientific and technological objectives of the various types of activities envisaged in the Fifth Framework Programme, as presented in this paper, have been defined with the aim of meeting the major economic and social challenges the Union is facing today and responding to the aspirations and expectations of its citizens. To achieve these objectives efficiently, a pronounced shift towards a more precise targeting of activities and a greater flexibility in implementation is proposed.

In drawing up its formal proposal, due to be adopted towards the end of March, the Commission still needs, in particular, to take into account the final conclusions and recommendations of the general five-year assessment report on the research activities of the Union. This report, which has been drawn up by the evaluation panel chaired by Viscount Davignon, should be publised in February. The Commission also intends to integrate the conclusions resulting from discussions on this second working paper. As with the two previous Communications, the ideas presented above are intended to fuel discussions in the Council and Parliament as well as with all other interested parties. A full and constructive discussion should result from the fact that these ideas are presented in this concrete and open manner.

With this debate the Commission is hoping to reconcile the pressing need for new ideas and methods of implementation with the need for continuity, not least chronologically, in the Union's research efforts. In this way, it will be able to ensure that, in the most propitious circumstances and for the benefit of all, the 5th Framework Programme contributes to "Inventing Tomorrow".

Annex I

KEY ACTIONS	CRITERIA								
	Social objectives			Economic development and scientific and technological prospects			European "value added"		
	Employment	*Quality of life, health*	*Environment*	*Growth*	*Competitiveness*	*Technological advances*	*"Critical mass"*	*Support for Union policies*	*European scale of problems*
The living world and ecosystem (I) health and food	✓✓	✓✓✓	✓	✓	✓✓	✓✓	✓✓	✓✓✓	✓✓✓
The living world and ecosystem (II) control of viral and infectious diseases	✓	✓✓✓	✓	✓	✓✓	✓✓✓	✓✓	✓✓✓	✓✓✓
The living world and ecosystem(III) the "cell factory"	✓✓	✓✓	✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓	✓✓	✓✓
The living world and ecosystem (IV) management and quality of water	✓✓	✓✓✓	✓✓✓	✓	✓✓	✓✓	✓✓	✓✓✓	✓✓✓
The living world and ecosystem (V) environment and health	✓	✓✓✓	✓✓✓	✓	✓	✓✓✓	✓✓	✓✓✓	✓✓
The living world and ecosystem (VI) new rural and coastal areas	✓✓	✓✓✓	✓✓✓	✓✓	✓✓✓	✓	✓✓	✓✓✓	✓✓✓
Information Society (I) services for the citizen	✓✓	✓✓✓	✓✓	✓✓	✓✓	✓✓✓	✓✓	✓✓✓	✓✓
Information Society (II) electronic trade and new methods of work	✓✓	✓✓	✓	✓✓✓	✓✓✓	✓✓	✓✓	✓✓✓	✓✓✓
Information Society (III) multimedia content	✓✓	✓✓✓	✓	✓✓✓	✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓
Information Society (IV) essential technologies and infrastructures	✓✓	✓✓	✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓	✓✓
Competitive and sustainable growth (I)products, processes organisation	✓✓✓	✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓	✓	✓✓✓	✓
Competitive and sustainable growth (II) sustainable mobility and intermodality	✓✓	✓✓	✓✓✓	✓✓	✓✓	✓✓	✓✓	✓✓✓	✓✓✓
Competitive and sustainable growth (III) new perspectives in aeronautics	✓✓	✓✓	✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓	✓✓✓
Competitive and sustainable growth (IV) marine technologies	✓✓	✓✓	✓✓	✓✓	✓✓✓	✓✓	✓✓	✓✓✓	✓✓✓
Competitive and sustainable growth (V) advanced energy systems and services	✓✓	✓✓✓	✓✓✓	✓✓	✓✓	✓✓✓	✓	✓✓✓	✓✓
Competitive and sustainable growth (VI) the city of tomorrow	✓✓	✓✓✓	✓✓✓	✓✓	✓	✓✓	✓	✓✓	✓✓✓
Space technology	✓	✓✓	✓✓✓	✓✓	✓✓✓	✓✓✓	✓✓	✓✓✓	✓✓✓

Printed in the United Kingdom by The Stationery Office Limited
292399 3/97 19585

ISBN 0-10-479097-0

9 780104 790977

Published by The Stationery Office Limited
and available from:

The Publications Centre
(Mail, telephone and fax orders only)
PO Box 276, London SW8 5DT
General enquiries 0171 873 0011
Telephone orders 0171 873 9090
Fax orders 0171 873 8200

The Stationery Office Bookshops
49 High Holborn, London WC1V 6HB
(counter service and fax orders only)
Fax 0171 831 1326
68-69 Bull Street, Birmingham B4 6AD
0121 236 9696 Fax 0121 236 9699
33 Wine Street, Bristol BS1 2BQ
01179 264306 Fax 01179 294515
9-21 Princess Street, Manchester M60 8AS
0161 834 7201 Fax 0161 833 0634
16 Arthur Street, Belfast BT1 4GD
0123 223 8451 Fax 0123 223 5401
The Stationery Office Oriel Bookshop
The Friary, Cardiff CF1 4AA
01222 395548 Fax 01222 384347
71 Lothian Road, Edinburgh EH3 9AZ
(counter service only)

In addition customers in Scotland may mail,
telephone or fax their orders to:
Scottish Publication Sales,
South Gyle Crescent, Edinburgh EH12 9EB
0131 479 3141 Fax 0131 479 3142

The Parliamentary Bookshop
12 Bridge Street, Parliament Square,
London SW1A 2JX
Telephone orders 0171 219 3890
General enquiries 0171 219 3890
Fax orders 0171 219 3866

Accredited Agents
(see Yellow Pages)

and through good booksellers

©Parliamentary copyright House of Lords 1997
Applications for reproduction should be made in writing to the Copyright Unit,
Her Majesty's Stationery Office, St. Clements House, 2-16 Colegate,
Norwich, NR3 1BQ – Fax 01603 723000

ISBN 0 10 479097 0